WATTLE RESEARCH INSTITUTE
19 APR 1958
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AGRICULTURAL *Chemicals*

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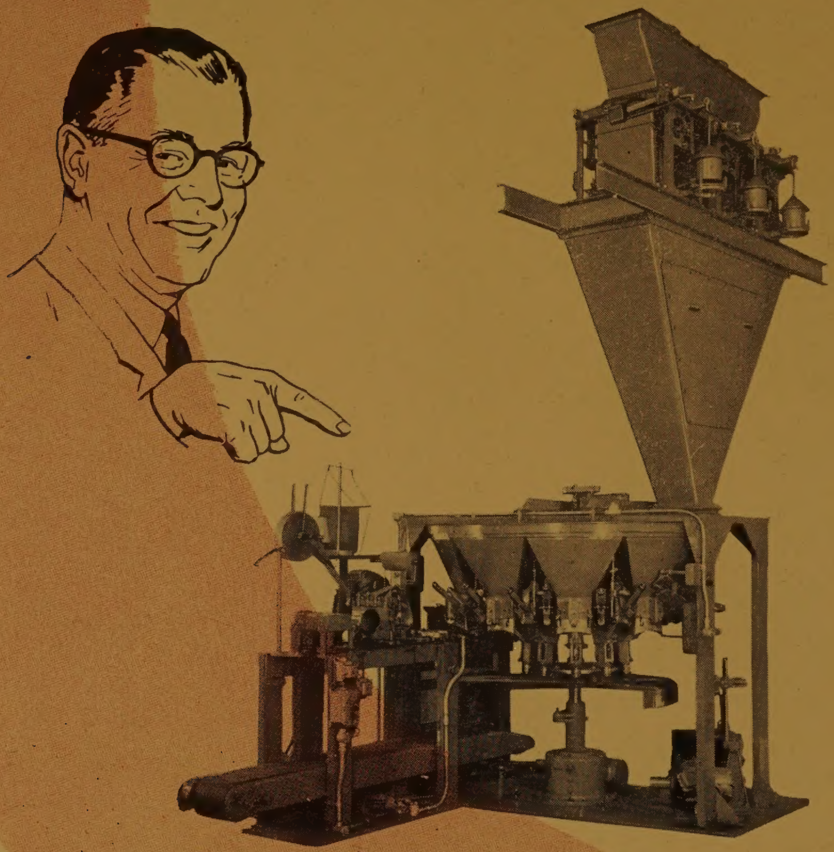
- A New Home Garden Line
- Nitrogen Losses
- The Pesticide Problem
- For the Fertilizer Dealer
- Forest Pest Control
- Fertilizer Developments
- What's New in Pesticides
- NPFI Survey Analysis

MARCH, 1958

SENSATION of the KANSAS CITY FEED PRODUCTION SCHOOL



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IP's Improved, New "Model AF"

- **Fills Faster—up to 25 bags per minute**
- **Saves Labor—1 man operation**
- **Saves Paper—uses bags 3" to 5" shorter**
- **Handles Pellets, Crumbles, or Mash**
- **Adaptable to Feeds, Fertilizers or similar products**

Maintains same filling rate whether you use 50 or 80 lb. bags

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Progress Report

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From the MOST MODERN POTASH PLANT IN THE WORLD Canadian production of Muriate is expected by December 1958

P.C.A.
"The SALT of the EARTH"
RED MURIATE

Meanwhile our Carlsbad Plant can serve your entire POTASH requirements with the very best material.

- **New 60% Standard Muriate**
- **New 60% Special Granular Muriate**
- **New 60% Coarse Granular Muriate**
- **Sulphate of Potash**
- **Chemical Muriate — 99.9% KCL minimum**

Quick Service — High Quality
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Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.
Southern Sales Office . . . Candler Building, Atlanta, Ga.

wherever crops are grown . . .

you'll sell more HEPTACHLOR in 1958

Proven preference and safety have made Heptachlor the preferred insecticide for the protection of food, feed, and fiber crops. In 1958, a Dealer "Sales Builder" program, a special information service for agricultural leaders, and powerful regional merchandising programs will increase demand, sales, and profits! Get complete information for your salesmen now!

AMERICA'S LEADING SOIL INSECTICIDE: Experiments and actual field tests have proved that Heptachlor is the most effective and versatile insecticide for control of soil insects that attack major crops!

PROTECTS FORAGE CROPS WITHOUT CONTAMINATING MILK OR MEAT! Because Heptachlor is such an effective insecticide, minimum amounts have residual effectiveness, yet are safe to use for foliage treatment and for treatment of crops fed to animals.

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International Representative: Velsicol International Corporation, C. A.
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Mail coupon for Fact Sheet describing 1958 Heptachlor "Sales Builder" programs and regional advertising campaigns!

AC-38

Velsicol Chemical Corporation,
330 East Grand Avenue · Chicago 11, Illinois.

Please send me your 1958 Heptachlor Promotions Fact Sheet

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Company____________________________

Address____________________________

City______________Zone____State______

This Month's Cover

Some of the new packages for the home garden market displayed at the New York Garden Show, held February 1-4 at the New York City Coliseum. See story page 47.

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Vol. 13, No. 3 **March 1958**

AGRICULTURAL *Chemicals*

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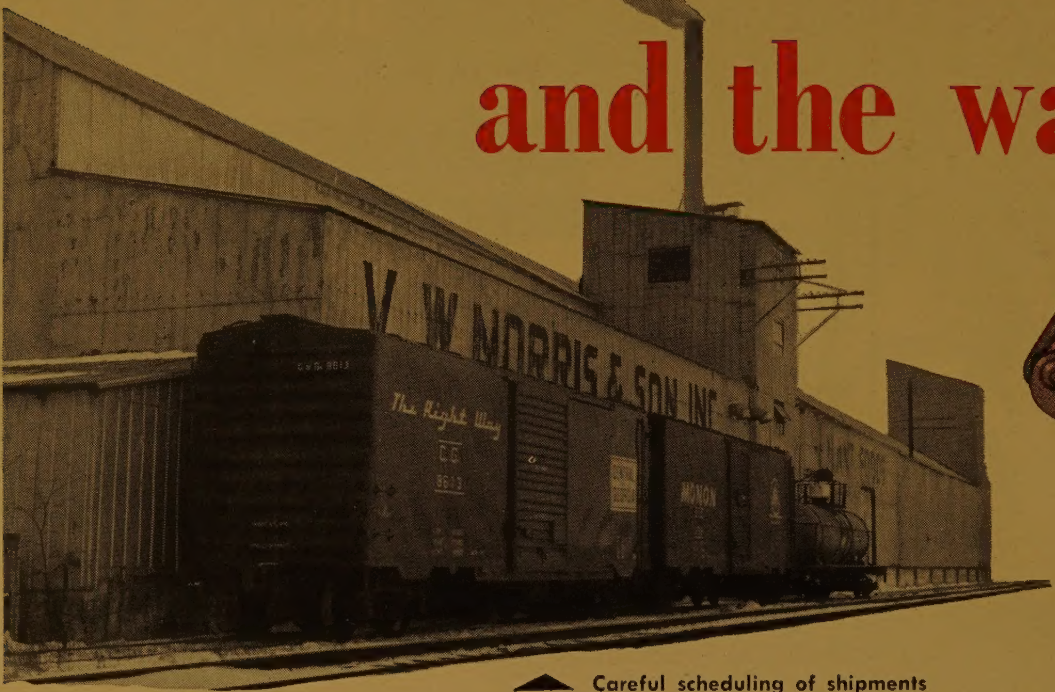
ADVERTISING RATES known on request. Closing date for copy—5th of month preceding month of issue.

It all boils down to this...

“We like

and the way



Careful scheduling of shipments puts International's Triple Super at the Norris plant to meet peak-season demands. The Norris plant, a crane-type installation, was built in 1946.

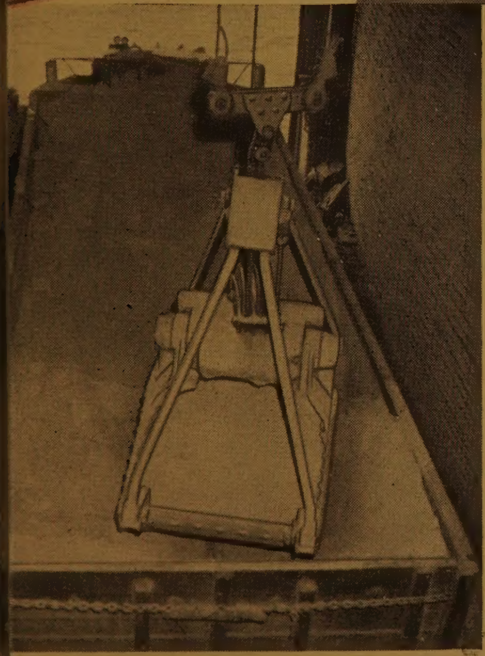
R. W. (Dick) Thatcher, sales manager, and Plant Superintendent Walker Elliott inspect the uniformity of granular 5-20-20. The company produces 12 different grades of granulated plant food, all sold within the rich crop and livestock area surrounding Rushville.

International's Triple they do business"

says

A. C. NORRIS,

president
V. W. Norris & Son, Inc.
Rushville, Indiana



Nearly all materials handling, including the unloading of trucks, is done by crane. All production employees are trained to operate crane . . . keep clam-shell operating round-the-clock in peak seasons.

INTERNATIONAL's personalized service and quality product have helped V. W. Norris & Son build a healthy demand for granular fertilizer around Rushville, Indiana.

The Norris company installed its granulation unit in 1954 and became the first Indiana plant to granulate all grades. A veteran of 60 years' experience in selling fertilizers, the firm has manufactured its own mixed goods since 1946 when the present plant was built.

Norris' plant is an overhead crane-type operation — with a one-ton clam-shell that unloads trucks . . . moves raw materials to batch hoppers . . . transfers mixed goods to storage bins. It's about as close to a one-man operation as you can get.

And International's Triple Super is a plant regular. Alfred Norris has two reasons. "International delivers the triple we need . . . and we like the way they do business."

Benefit now from International's dependable service and top-quality product — make International's Triple Super a regular in your own plant. Write or wire for full information.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

PHOSPHATE CHEMICALS DIVISION . . . . 20 N. WACKER DRIVE, CHICAGO 6, ILL.

Trade Listing

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute, 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

Regional Offices listed on page 123.

Soil Science Society of America, 2702 Monroe St., Madison, Wisc. L. G. Monthey, executive secretary.

American Phytopathological Society, S. E. A. McCallan, secretary. Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino, California.

Chemical Specialty Manufacturers' Association, 110 East 42nd St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

Mid-West Soil Improvement Committee, 121 West Wacker Drive, Chicago 1, Ill. Z. H. Beers, executive-secretary.

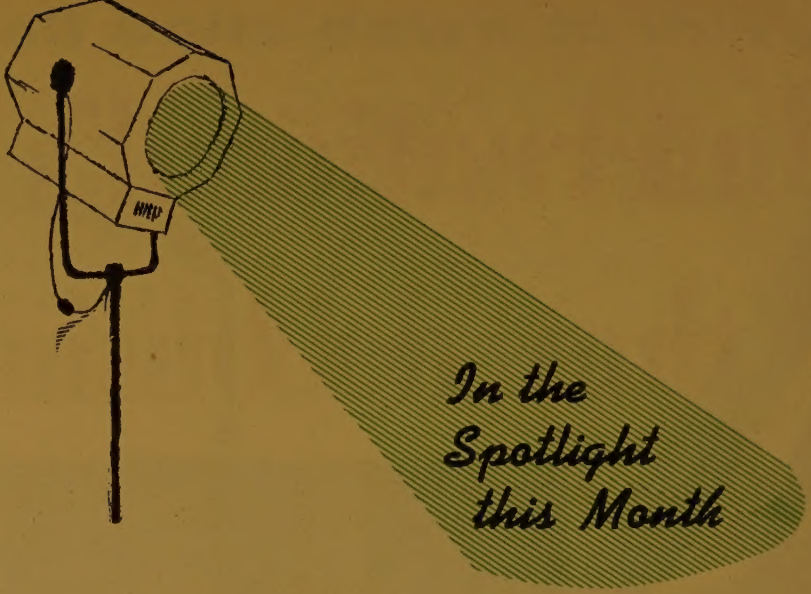
National Nitrogen Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, PO Box 9905, Memphis, Tenn.

American Society of Agronomy, 2702 Monroe St., Madison Wisc. L. G. Monthey, executive secretary.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association. Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.


wmp
In the Spotlight this Month

- **Ammoniation of Superphosphates** . . . A review with comments on the various factors influencing the ammoniation of superphosphates, and discussion on the related question of factors affecting nitrogen losses in production of granulated fertilizers. Page 30.

- **The Eveready Line** . . . National Carbon Co. are this month distributing the first shipments of their new line of products for the home garden market. They feel that "a compact line of top quality products, thoroughly tested, well packaged and containing as toxicants some of the basic chemicals that Carbide research has produced, will establish a successful sales record in the market." Page 28.

- **Forest Pest Control** . . . Increasing public recognition of the extensive losses caused by insects to the forests of the United States is reflected in cooperative efforts of industry, private concerns, government, etc. to control pests by both chemical and biologic means. Page 39.

- **Farm Surpluses** . . . Dr. Vincent Sauchelli presents some thoughts on farm income, the farm surplus program, and agricultural technology. He emphasizes the need for continued advances in techniques and methods, and calls for more production and more efficient production of farm products. Page 40.

- **The Pesticide Problem** . . . Review of a 57-page report, which among other points, indicates fish mortality results from DDT applications in excess of .25 pounds per acre; little field damage to birds is reported at concentrations less than two pounds per acre; and emulsions are the most toxic forms of insecticide applications. The report was prepared by Dr. John L. George, who presents an honest appraisal of the pesticide problem, with some suggestions on a research and analysis program. Page 33.

- **Farmers and Fertilizer** . . . NPFI's survey on who and what influences the farmer shows that although farmers recognize the importance of fertilizer use, some are inclined to think of it as an investment carrying a certain financial risk with uncertain benefits. Only 9 per cent of farmers in the north central area were reported using fertilizers at rates approximating those recommended by their state experiment station. Page 49.

QUIZ
For Multiwall Bag Buyers

"How Does Your Packaging Operation Rate?"

1 Is your bag correctly sized for your product?

2 Is your bag properly constructed for your product?

3 If loss of product is caused by deterioration, would special protective sheets help to reduce such loss?

4 Is the total cost of your bag out of proportion to the selling price of your product?

5 Does your product cost warrant redesigning your bag to merchandise your product more effectively?

6 Are you using the most economical filling machine available for packaging?

7 Are your current suppliers giving you the service you desire?

8 Are your suppliers integrated and capable of maintaining dependable service at all times, under all conditions?

9 Are your suppliers' representatives qualified to help you with your packaging, sales promotion and marketing?

Perhaps we may be able to help you to arrive at the right answers in order to achieve higher production at lower costs.

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☐ O.K. Kraft...Help me to answer your Quiz.
Please have representative call. AC
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CITY ZONE STATE
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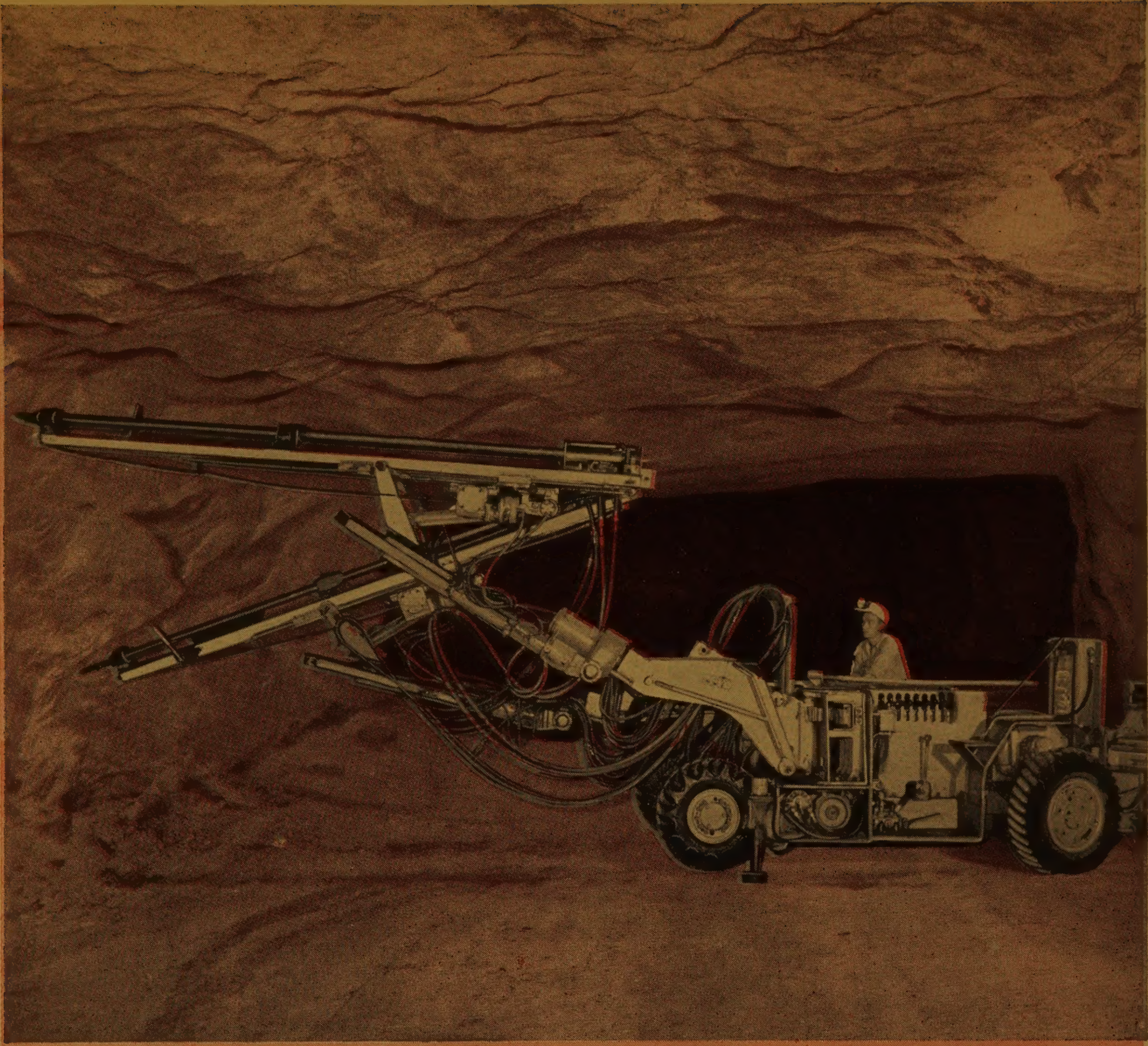

DUVAL

Drilling blast holes with a multiple mounted drill in the Duval mines near Carlsbad, New Mexico. One of the many processes which bring you . . .

High Grade Muriate of Potash...

HIGH ANALYSIS • DEPENDABLE SUPPLY • UNSURPASSED SERVICE

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Whether the mesh is 10 or 20, Bradley Hercules Mills reduce limestone to a uniform fineness in a single operation without additional screening ..... produce finished material containing a large percentage of 60, 100 and 200 mesh. And Bradley Hercules Mills also eliminate manual operation through an electrical feed control. Their rugged construction ... dustless operation ... easy accessibility to grinding parts keep maintenance costs at an absolute minimum ... provide maximum service, 7 days a week. In sizes to meet any plant's requirements for a superior grade of agricultural limestone ... at moderate cost.

For complete information, write for Catalog No. 63

BRADLEY PULVERIZER CO. LONDON ALLENTOWN, PA. BOSTON
superior grinding equipment since 1891

Sure, there are other fast fertilizer baggers, but only the Bemis Rapid-Weigh Bagger gives you such

SPEED PLUS ACCURACY

HERE is a completely new concept and design in weighing and filling machines . . . fast, simple, clean, rugged, trouble-free.

And surprisingly low priced. It is completely practical for the operator for whom a big machine investment is not warranted . . . for the operator whose production is in spurts—high and low . . . and for the operator who needs fast, full-time production.

The RAPID-WEIGH Bagger takes open-mouth paper or textile bags, from 25- to 200-lb. capacity . . . and handles pelleted, granular or meal-type fertilizers.

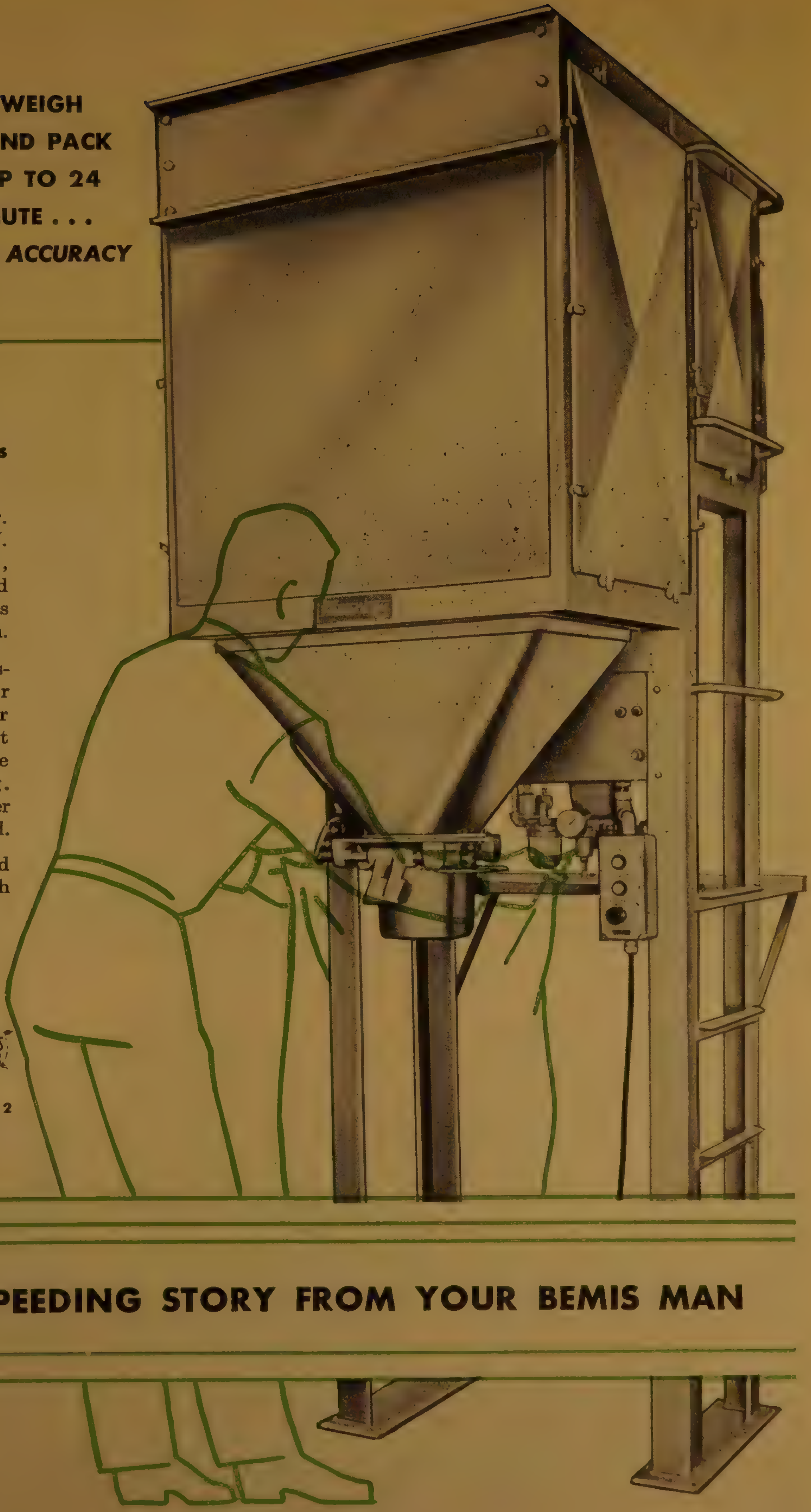
Corrosion costs and troubles are minimized, because all functional parts and those in contact with the fertilizer are made of stainless steel, and corrosion-resistant paint is used throughout.

Combine the RAPID-WEIGH Bagger with . . .

- **Vee-Slat Conveyor, which carries bags without operator's assistance.**
- **Bemis-designed automatic sewing machine actuator and thread-clipping mechanism.**
- **A standard sewing machine or, better yet,**
- **A Bemistape Top-Closing Machine . . .**

and you will have the most efficient, economical bag-filling and -closing operation available in the fertilizer industry.

GET THE COMPLETE, MONEY-SAVING,



THE NEW BEMIS RAPID-WEIGH BAGGER WILL WEIGH AND PACK FERTILIZER AT SPEEDS UP TO 24 100-LB. BAGS PER MINUTE . . . WITH AVERAGE *WEIGHT ACCURACY WITHIN 2 OUNCES*

What Do RAPID-WEIGH Users Say? Read this . . .

"Our packing crew," says Mr. Warner W. Price, of Warner W. Price Co., Inc., Smyrna, Del., "has never had it as easy, or held such good weights, or packed as fast as they are doing this season.

"We used to have a line of customers' trucks waiting at our plant. One day recently a customer drove up and thought the plant must be closed—no trucks. But the plant was actually humming. Production was so much better that waiting had been eliminated.

"To sum it up, we're delighted with the new Rapid-Weigh equipment."

Bemis

General Offices—408 Pine St., St. Louis 2
Sales Offices in Principal Cities

PRODUCTION-SPEEDING STORY FROM YOUR BEMIS MAN

ACTUAL PHOTO OF MONSANTO'S LION IN A DEALER'S STORE

To make more money—put LION in your store

LION BRAND AMMONIUM NITRATE advertising and field promotion help you sell more by getting across to your customers these facts:

- Lion brand is *guaranteed* to contain 33.5% nitrogen.
- Lion brand contains both of two important kinds of nitrogen: quick-acting nitrate nitrogen that gets plants started fast . . . and *long-lasting* ammonia nitrogen that resists leaching, feeds crops steadily for months.
- Lion brand is prilled . . . coated pellets of uniform size for easier spreading.
- Lion brand is *guaranteed* to flow freely not for just a year, but *until used*, when stored properly.
- Lion brand is now in a new green and yellow bag constructed to give greater protection.

MONSANTO'S PROMOTION AND ADVERTISING increase your sales and profits with:

- Advertising campaigns promoting mixed fertilizer as well as Lion brand in leading farm publications read by your customers.
- Local farm radio, billboards and local newspaper advertising support.
- Literature on crops grown in your area, including mixed fertilizer recommendations.
- Fertilization wall charts for your area.
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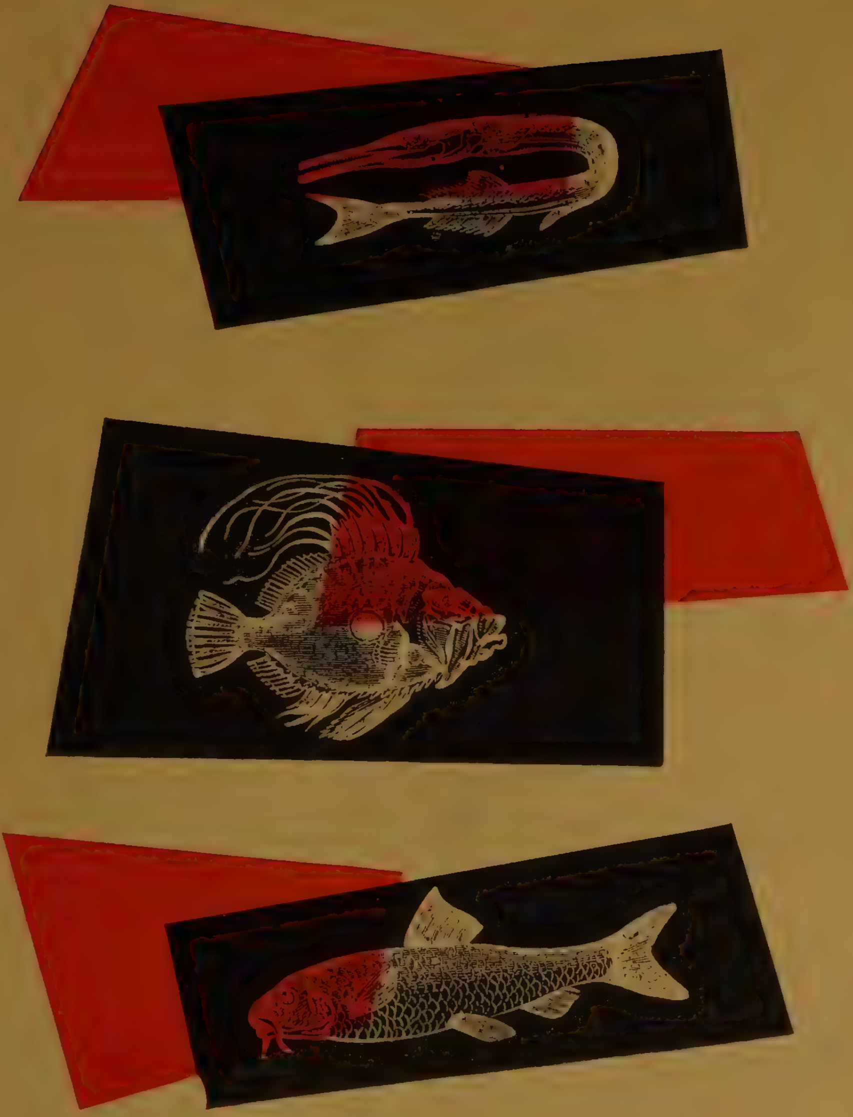

FRESH FISH . . . A HUNGRY MINK . . . AND YOU!

When fresh fish became unobtainable for Midwest mink ranches, Crown Zellerbach's Technical Services Department developed a Multiwall Bag to ship them fresh-frozen from the West Coast.

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DEALERS AND FORMULATORS: Profit by the aggressive, consistent promotion of DETHMOR Warfarin — now in its ninth year. Plenty of profitable business for all! For information write Penick today.

PENICK

Agricultural Chemical and Insecticide Division

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Approved by government and college experiment and extension facilities, Espesol 5 is a premium quality, high specification diluent that will let you offer your customers a premium product. Available to you on short notice from all of Eastern States' terminal facilities, Espesol 5 can be ordered in drum, transport, tank car, barge and ship tank lots.

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It handles all modern concentrate formulations as well as sulphur bearing products and other field strength dusts with equal efficiency. On sulphur grinding, it is first in safety, economy and dust-free operation.

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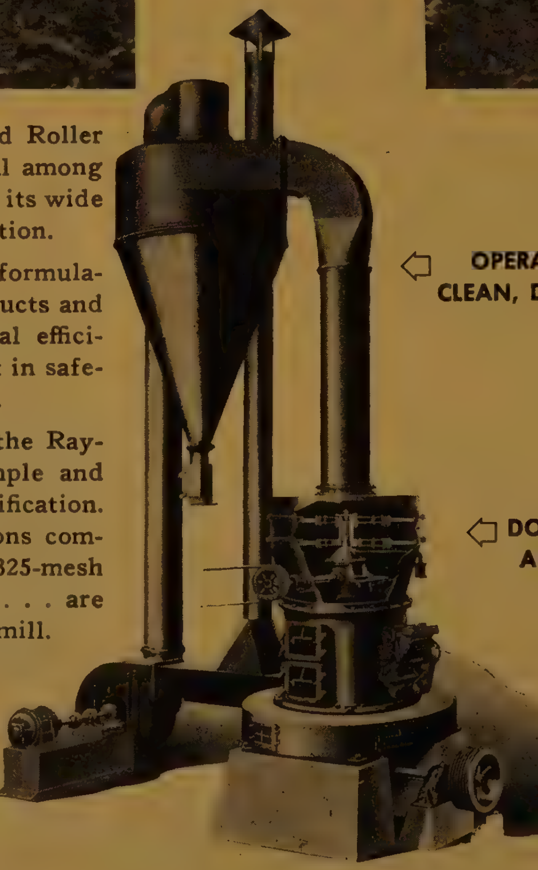

OPERATION CLEAN, DUSTLESS

DOUBLE WHIZZER AIR SEPARATOR

AUTOMATIC FEEDER

It is a slow-speed, cool running unit that gives good results in handling materials which have a tendency to stick in the grinding or blending operations. It provides 24-hour production, as it prevents build-ups on the grinding surfaces of the mill or in the separating system.

Write for Bulletin #84 on Insecticide Grinding Mills.

COMBUSTION ENGINEERING, INC.
Raymond Division

1314 NORTH BRANCH ST.
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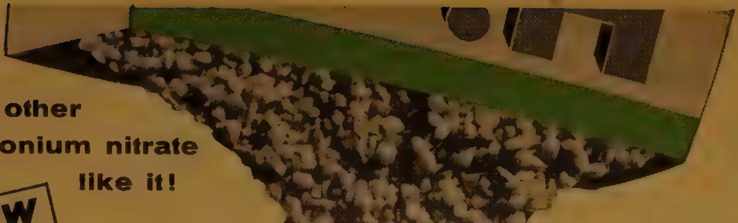
SALES OFFICES IN
PRINCIPAL CITIES

Combustion Engineering-Superheater Ltd., Montreal, Canada

This advertisement sells Hi-D Ammonium Nitrate Fertilizer. Ads like this are appearing regularly in The Progressive Farmer, Prairie Farmer, Farm & Ranch, Florida Grower & Rancher, Rice Journal and The Citrus Magazine.



No other ammonium nitrate like it!

NEW

Hi-D® and only Hi-D

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When you choose an economical source of supplemental nitrogen, be sure to look into the important combination of advantages supplied only by Hi-D. Made by an exclusive process, new Hi-D represents the latest development in nitrogen fertilizer. You get these 8 big benefits from Hi-D — *and only from Hi-D.*

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A patented manufacturing method removes all the moisture from Hi-D *before* the granule is formed.

2. High Density.

Because of this new process, each Hi-D granule is of extremely high density. These hard, non-porous granules lock out moisture, even under humid field conditions. Hi-D is *made dry*—and *stays dry.*

3. Special-Shape Granules.

Note the magnified granule. The unique shape and size are controlled so that distribution is even and accurate in all types of spreading operations. And the flat-sided granules stay put on the ground.

4. Free Flow.

Hi-D flows freely even on hot sticky days. Because of its super dryness, high density, and special shape, Hi-D doesn't gum-up, doesn't stick, clog, cake or bridge.

5. Two Key Kinds of Nitrogen.

Hi-D supplies two types of nitrogen—*nitrate* nitrogen and *ammonia* nitrogen. Just one bag of Hi-D supplies as much nitrogen as 1½ bags of ammonium sulphate or 2 bags of sodium nitrate. And Hi-D costs less per unit of nitrogen than these older types.

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Hi-D supplies a total of 33.5% nitrogen in two equal "servings." 16.75% is *nitrate* nitrogen to get crops off to a fast vigorous start. 16.75% is *ammonia* nitrogen for follow-up feeding during the growing season.

7. Up to 25% More Nitrogen Per Hopper Load.

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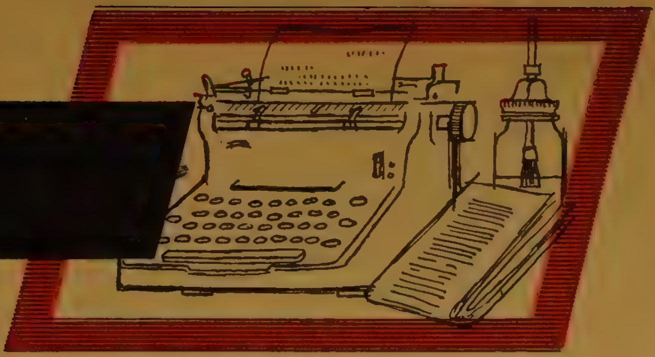
EDITORIALS



ENTOMOLOGISTS on the U.S.D.A. staff might be pardoned if they were to develop the feeling that it would have been just as well if they had let the gypsy moth run wild over the country. Organic gardeners, bird lovers, professional DDT haters, and property owners who object to low-flying aircraft have all been having a field day ever since last year's major tri-state spray program. Aided and abetted by the metropolitan press they are currently expressing their disapproval of this and all future spray projects to their hearts' content in the action being heard in Brooklyn before Judge Walter Bruchhausen. And included among the hostile critics of the gypsy moth spray project are numerous rugged defenders of human privacy and the rights of the individual who would no doubt object if they were being sprayed with Chanel 5 rather than DDT.

Much of the testimony being presented by the critics of aerial spraying is meaningless scientifically. For example, cross examination of a typical witness, who reported the death of some fish following the spray program, disclosed that he knew nothing of the chemistry or toxicology of pesticides, and disclosed that no analysis had actually been performed to determine whether or not it was the DDT that actually caused the death of the fish in question.

Much more weight must be attached to a recent study of "The Pesticide Problem" prepared for the New York Zoological Society by Dr. John L. George and reviewed elsewhere in this issue (Pg. 33). While admitting the important role that pesticides must continue to play in maintaining our agricultural output, Dr. George suggests that a government-financed program be undertaken to evaluate the numerous problems involved in insect control on a large scale, and to render judgments as to the balance of gains and losses to be expected from such programs—gains in crop production and freedom from insect attack—and the extent of possible losses to wild life. This report should receive close scrutiny by all those concerned with pesticides and their use.

With one finding embodied in Dr. George's report we are in complete accord. There is a very evident need for a better public relations program. "Full details should be given on each big control program, and if calculated risks are to be taken, the public should be informed." Had we had a little better advance planning, and a real public relations program in advance of last year's spray project, public opinion could undoubtedly have been marshalled behind the program, and the ground cut out from under the fringe of insecticide haters who are now presenting their testimony in the Eastern District Federal Court.

THE fertilizer industry has for some time been thoroughly aware of a "leveling-off" in the fertilizer sales curve, in what for years had been a tremendously expanding market. The top in fertilizer consumption was reached in 1953—according to figures issued each year by the USDA—and since then annual sales have fallen off somewhat (on the other hand, preliminary figures for 1957 show a small gain over 1956—see *Agricultural Chemicals*, January, 1958, page 35).

This plateau in fertilizer consumption is a little hard to understand, since experiment station research indicates that farmers are using less

(*Continued on Page* 113)

A NEW entrant this season in the home and garden small package pesticide market is National Carbon Company, Division of Union Carbide Corporation. Their line of eleven home and garden pesticides which has attracted considerable attention at several recent garden and hardware shows is just starting to move out into the hands of distributors, and in the course of the next few weeks the "Eveready" label will be a familiar sight on the shelves of thousands of garden supply dealers throughout the country. Undaunted by the rather discouraging experiences that other marketers have had with some lines of garden pesticides over recent years, Union Carbide apparently feels that a compact line of top quality products, thoroughly tested, well packaged and backed by the well-known "Eveready" trade-mark, will establish a successful sales record in the market.

Decision to enter the garden supply market with a new line of pesticides was made following a study by Carbide's market research department. This survey, incidentally, disclosed that only three out of ten average home gardeners used a pesticide product during the 1956 season, which convinced Union Carbide's researchers that the market is far from saturated. They are confident it can be expanded with intelligently conceived and formulated products. A further note turned up in the research was that only 14% of those home gardeners who did use pesticides in '56 recalled specifically the brand name of the product they had used. This situation has persuaded Union Carbide sales executives that the typical buyer is not "married" to any particular line of products, and that a new line with merit would have a chance to pick off a share of existing business.

The new "Eveready" garden product line consists of 11 products in 20 different sizes and containers. Five of the items are offered in the new squeeze dusters (rose dust, floral dust, vegetable dust, tomato dust and a chlordane ant killer). Two are aerosols (a rose spray and a dual purpose home and garden spray). Another pair of products are packed in bottles (a garden spray and a crab grass preventive) while the final two products are packed in cans (a fruit tree spray and a weed killer). All five of the squeeze duster packed products (the rose dust, floral dust, vegetable dust, and the chlordane ant killer) are also packed in bags and the rose dust is also offered in a third package, a canister.

Two of the products, the home and garden spray and the ant killer, will be offered for household use as well as for the garden, and it is indicated that there may later be additional products for the household market. The first addition to the new line, however, bringing the list of products up to an even dozen, will be a broadleaf weed killer.

Packaging is performed at various locations across the country by private packagers under the supervision of National Carbon's quality control and specifications division. The formulations themselves are the result of a cooperative effort between Union Carbide's technical staff and outside consultants.

Those responsible for selecting the ingredients have apparently been perfectly free to pick and choose the ingredients they want, regardless of the source of the manufacturer.

AGRICULTURAL CHEMICALS staff representatives interviewed D. K. Harrison, sales manager for National Carbon's home and garden products, in mid February to find out a little more about the new line and to determine just why Union Carbide management apparently feels that they can succeed in what is generally recognized as a really tough market to crack. It must be realized, of course, that Union Carbide is by no means a newcomer in the insecticide business,—but that other divisions of the company have extensive experience in the field. Union Carbide Chemicals Company operates a 140 acre test farm at Clayton, N.C., and two research laboratories, one at South Charleston, W.Va., and the other at Boyce Thompson Institute in Yonkers, New York. From Union Carbide research have come such products as "Crag" brand herbicides and fly repellents, Glyodin fungicide, "Mylone" soil fumigant, etc.

Projecting this solid background in pesticides into the companion phases of distribution and sales, Union Carbide's "Eveready" brand on flashlights and batteries is very well-known, and the trade-mark "Eveready" is highly respected in the hardware field, where substantial quantities of garden pesticides move to market. This well-established distribution set-up forms a powerful nucleus for the new "Eveready" garden line, which is rapidly being augmented by a group of feed, seed, garden specialty distributing outlets.

In the collective mind of Union Carbide management, the line of home and garden pesticides that they believe has the best chance to build substantial sales volume at a satisfactory profit is a "compact" line of broad spectrum pesticides, with formulations being varied for given classes of plants, vegetables or ornamentals. They believe in a "compact" line, because their research showed them that 80 per cent of the volume in the garden pesticide market is done on 20 per cent of the items sold. They have no desire to handle an extensive line, nor to ask their retailers to stock a lengthy list of packages in which a high percentage of the items will turn over in such small volume as to be unprofitable.

Their belief in "broad spectrum" pesticides is based on the feeling that single toxicants, — "specifics" — have been over emphasized. They are convinced that what the informed home gardener wants is a single formulation for each class of "crop" to be treated that will function as a combination insecticide—fungicide—miticide—aphicide. They don't believe in the single "all purpose" pesticide, but neither do they believe that the amateur gardener can effectively select from a wide list of specific pesticides. Instead they plan to offer him one product for each general class of plant, vegetable or ornamental to be protected.

National Carbon have come up with what seem to be some very practical ideas on packaging for their new line. They are strong for the squeeze duster package in preference to the old style hand pump duster. With the squeeze duster, one-hand application is possible, leaving the other hand free to hold back interfering foliage.

Believing, too, that the paper bag is a very logical bulk package for the home garden market because it is so easy to use, they have improved this popular package by adopting a two-ply kraft construction with a heavy polyethylene liner. The package is heat sealed after filling to make it completely dust proof. The bags are equipped with tin-ties similar to those used on coffee bags so the mouth opening can be reclosed tightly. A new idea has been introduced in labeling the bagged products. A sales message is carried on the bottom of each bag so that it will be readily visible to the shopper when the bags, as they often must be, are stacked horizontally on the retail shelves.

(*Continued on Page* 125)

What are the factors that influence the AMMONIATION of SUPERPHOSPHATES

What are the factors affecting NITROGEN LOSSES in production of granulated fertilizers?

Introduction by G. L. Bridger

THE two questions are discussed together since they are both concerned with the same problem, namely, the introduction of nitrogen compounds into mixed fertilizers without loss.

Under certain conditions nitrogen may be lost in mixed fertilizer production in the ammoniation step, the drying step, and possibly the storage period.

Ammoniation Step

IN the ammoniation step, the problem is to get as much free ammonia as possible combined with the superphosphates used in the formulation, without excessive loss of nitrogen or excessive P_2O_5 reversion, since any free ammonia not absorbed by superphosphates requires addition of sulfuric or phosphoric acid for its neutralization. The free ammonia may be added as anhydrous ammonia or as a nitrogen solution.

The factors controlling absorption of ammonia are the chemical and physical properties of the superphosphates used, the ammoniation rate, the time and temperature provided for the chemical reactions, and distribution of the mixing system for providing intimate contact between anhydrous ammonia, nitrogen solution, acid, and solid ingredients.

PROPERTIES OF SUPERPHOSPHATES. Physical properties of both normal and triple superphosphates are generally more important than chemical properties with respect to their ammoniation characteristics. Superphosphates consist principally of monocalcium phosphate monohydrate with a small proportion of free phosphoric acid and a considerable proportion of calcium sulfate in the case of normal superphosphate. The properties of superphosphates that are most important are particle size, moisture content, and porosity.

In studies made by Kumagai, Rapp and Hardesty (*Ag. & Food Chem.* 2, 25, 1954) at United States Department of Agriculture and by Waters, Arnold, and Payne and coworkers at Allied Chemical & Dye Corporation (*Ag. & Food Chem.* 3, 218, 1955), it was shown that only the minus 80 mesh fraction of both normal and triple superphosphate absorbed ammonia completely when the usual ammoniation rates are used (4 lbs. of NH_3 per unit of available P_2O_5 for triple superphosphate and 6 lbs. of NH_3 per unit of available P_2O_5 for normal superphosphate). As the particle size increased from 80 mesh to 4 mesh, the percentage absorption decreased to about 60% for normal superphosphate and 80% for triple superphosphate. In plant operation, it is of course impractical to screen superphosphates to minus 80 mesh before use, but these results point to the desirability of keeping the particle size as small as practical with the equipment at hand.

The moisture content of normal or triple superphosphate should be at least 6% for good ammonia absorption. The above workers showed that superphosphates that will absorb 95% of the ammonia at 6% moisture will absorb only 90% at 4% moisture and 80% at 2% moisture.

The porosity of the superphosphate is a most important property, but there is no quantitative way in which its effect can be measured except an actual ammoniation test. I am referring primarily to the microcrystalline property rather than the space between individual particles of superphosphate. Superphosphates may differ considerably in porosity depending on their method of manufacture. Some artifically dried superphosphates are less porous than storage cured products.

AMMONIATION RATE. Ammoniation rate, or the ratio of ammonia to the available P_2O_5 content of the superphosphate, is one of the most important factors in ammonia absorption. If too much ammonia is used, much of it is simply not absorbed and goes up the stack, and furthermore reversion of the available P_2O_5 to an insoluble form may take place. Widely accepted ammoniation rates in the industry are 4 lbs. of NH$_3$ per unit of available P_2O_5 for triple superphosphate and 6 lbs. of NH$_3$ per unit of available P_2O_5 for normal superphosphate. With these rates at least 95% recovery of the ammonia can be expected if all conditions are favorable.

TIME OF REACTION. Sufficient time must be provided for the free ammonia to contact the superphosphate and be absorbed throughout the mass. More time must be provided for high ammoniation rates than for low ammoniation rates. At the commonly used rates mentioned above, a reaction time of above three minutes is necessary. This will depend somewhat on the type of equipment in which the reaction takes place and whether ammoniation is done batchwise or continuously.

TEMPERATURE OF REACTION. Reaction temperature is not as important as some of the other factors, and has relatively little influence on absorption of ammonia by normal superphosphate over a maximum temperature range of 122-190° F. Higher temperatures favor ammonia absorption by the triple superphosphate over a range of 149-216°F. Usually temperature cannot be controlled as well as other factors since it is influenced by climatic conditions and varies from one formulation to another.

DISTRIBUTION AND MIXING SYSTEM. It is very important that the anhydrous ammonia, nitrogen solution, and acid be added as uniformly as possible throughout the bed of materials in the mixer and that the mixing be as good as possible. The means to accomplish this are varied depending upon the equipment used and whether the system is batch or continuous. It is obvious that without good distribution there will be a tendency for over-ammoniation and consequent loss of ammonia in localized areas, and under-ammoniation in other areas. Furthermore poor distribution contributes to over-granulation and lump formation, because of excessive moisture and temperature in localized areas. A more serious consequence of poor distribution is release of ammonium chloride fumes due to localized excess of acid; these attack potassium chloride, forming hydrogen chloride vapor, which forms ammonium chloride fumes upon reaction with ammonia vapor.

Drying Step

AFTER ammonia has been absorbed more or less efficiently in the mixing step, further nitrogen loss is possible in the drying step if conditions are not properly controlled. The most important factors contributing to nitrogen loss here are temperature, time, and ammoniation rate. These factors were studied by Bridger and Burzlaff at Iowa State College (*Ag. & Food Chem.* 2, 1954.)

A SURVEY* IN 3 PARTS

PART 1

General Introduction

by G. L. Bridger

W. R. Grace Co.
Baltimore, Md.

additional comments by

John Hardesty, USDA
Washington, D. C.

T. P. Hignett, TVA
Wilson Dam, Ala.

Elmer Perrine
Nitrogen Div., N.Y.C.

PART 2 AND 3

Effect of Particle Size
Time and Temperature
Rate of Ammoniation
The Drying Step
The Storage Step

*The comments in this review were made at the Fertilizer Industry Round Table held in Washington, D. C., November, 1957.

TEMPERATURE. The most important factor governing nitrogen loss in the dryer is temperature to which the product is heated. Nitrogen compounds are relatively unstable at moderate temperatures; for example, diammonium phosphate begins to lose appreciable amounts of nitrogen at about 200° F. Other nitrogen compounds are more stable but all have an appreciable vapor pressure of ammonia at temperatures which may be encountered in fertilizer processes.

In the studies at Iowa State College, it was found that appreciable nitrogen losses occurred in some cases at product temperatures as low as 150° F. Nitrogen losses as high as 20% were found to occur at product temperatures in the range 250-300° F., and with inlet air temperatures in the range 400-600° F. These high losses were for fertilizers made from ammoniation of normal superphosphate at a rate of 5.4 lbs. of ammonia per unit of available P_2O_5 and with a dryer retention time of about twenty minutes.

The loss of nitrogen caused by overheating can be demonstrated easily in the laboratory by heating samples of fertilizer to various tempertures. Depending on their composition, fume evolution will generally be observed in the temperature range 300 to 500° F.

TIME. The nitrogen loss increases gradually with increasing dryer retention time, so that conditions should be such as to achieve the desired degree of drying in the minimum time possible.

RATE OF AMMONIATION. Nitrogen losses on drying increase as the rate of ammoniation is increased, since diammonium phosphate is more easily decomposed than monoammonium phosphate. If therefore ammoniation is high enough to form diammonium phosphate, nitrogen losses on drying are more likely.

Storage Step

NITROGEN loss in storage of mixed fertilizers does not occur except under very unusual conditions. In high-nitrogen grades, it is possible that decomposition of nitrogen compounds may occur if localized overheating is permitted, in which case the decomposition may spread and a serious fire result. If alkaline materials such as lime are mixed with the fertilizer, liberation of ammonia will take place.

Comments by John Hardesty:

EXPERIMENTAL data, confirmed by plant practice, indicate the following conditions for best ammoniation:

(1) Both ordinary and triple superphosphates should consist of fine, soft, *porous particles* rather than coarse, hard, dense particles.

(2) The ammoniation rate for *ordinary superphosphate should not exceed 6 pounds* of neutralizing ammonia per unit of P_2O_5; and for *triple superphosphate, 4 pounds* per unit of P_2O_5.

(3) The *initial moisture content* of the superphosphates, either ordinary or triple, should not be less than 3%.

(4) The superphosphates should contain as *small a proportion of coarse particles* (+20 mesh) as practicable.

(5) The *reaction temperature* for ordinary superphosphate is not important, but for maximum absorption of ammonia by triple superphosphate it should be near 212° F.

(6) The *reaction time* should be not less than 3 minutes.

(7) *Cooling* of the product at the end of the processing stage is essential.

Comments by T. P. Hignett:

IN THE absence of granulation and when using anhydrous ammonia, absorption increases as the particle size of the superphosphate is decreased from 5 to 80 mesh, increases as the moisture content of the superphosphate is increased from 1 to 9 per cent, and is more rapid with porous than dense superphosphate.

When using ammoniating solutions, the moisture content of the superphosphate may be less important. If the total moisture content of the mix reaches the point at which the mix becomes muddy, ammonia absorption may be poor.

When ammoniation and granulation are carried out simultaneously, the initial particle size of the superphosphate is relatively unimportant since the ammonia is absorbed in granules that form during ammoniation. It is important to prevent overgranulation, since ammonia absorption in oversize granules is poor.

Also, when ammoniation and granulation occur simultaneously, the initial moisture content of the superphosphate is not particularly important since water is usually added if necessary to obtain good granulation. In making high-nitrogen grades, dry superphosphate may yield better results. If the superphosphate is too wet, it may be difficult to prevent overgranulation and consequent ammonia loss.

Porosity of the superphosphate strongly affects ammoniation absorption either in the presence or absence of granulation. It is probably the most important physical property that affects ammoniation.

Overacidulation in the production of superphosphate increases its ammonia holding capacity. This is not likely to be an important variable in the range of acidulation usually encountered in practice.

Comments by Elmer C. Perrine

FOUR properties of superphosphate that influence its ammoniation to some degree are particle size, free acid content, water, and porosity affecting the area exposed.

The equipment and the use of equipment have more influence on ammoniation than do the characteristics of the superphosphates themselves. Of the characteristics of superphospate which do materially influence ammoniation, particle size is probably the most important.

Under plant conditions, particle size alone can cause as much as 40% of the weight of a superphosphate to absorb only half as much ammonia per unit of P_2O_5 as that portion that is above 50 mesh.

From data available it seems logical to conclude that under plant conditions ammonia readily penetrates to the center of superphosphate particles that are no larger than around 40 mesh, and that at larger than 30 mesh there is a rapid falling off in ammonia take-up.

When agglomeration of all ingredients has begun before all of the ammonia has been added, the result is similar to increasing the particle size of the superphosphate alone.

The influence of free acid on ammoniation in most commercial superphosphates can be calculated to a nicety. One grade of 20% superphosphate will absorb only about .6 pounds more of ammonia per unit of superphosphate because of its higher acid content compared with one of a low acid content. This is a factor of about 10% in high rates of ammoniation.

The amount of water in superphosphate itself or total water in the mixture has little direct influence, but indirectly the influence of water is sometimes quite great. At high rates of ammoniation, water at 170°F to 200°F will hold very little ammonia. Where the water may permit premature granulation or agglomeration, as mentioned earlier, it does influence ammoniation, but this is not necessarily a property of the superphosphate itself.

The long-held rate of 3 pounds of ammonia in 20% superphosphate was low because of equipment and techniques; and not because of properties of superphosphates. Rates of ammoniation more than doubled when simple changes were made to permit uniform mixing of the ammoniating medium as it entered the mass and also provided for reacting the ammonia gas that is generated as the temperature of the mass increases from the heat of reaction. By willingness to lose some ammonia through excess application without the use of acid with equipment and techniques that hold essentially 100% of an input of 6.5 pounds of ammonia per unit of P_2O_5 in 20% superphosphate, some operators are holding as much as 8.0 pounds of ammonia when 9 pounds are applied. Beyond these rates of application the loss of ammonia is nearly 100% for any additional applied. Comparable data for this excess ammoniation for triple super is not available.

(*Continued Next Month*)

THE PESTICIDE PROBLEM

THE recent public reaction to the gypsy moth spray campaign indicates that there has been a poor communication between control agencies and the public, according to Dr. John L. George, associate curator of mammals for the New York Zoological Park. Dr. George believes that the public is still apprehensive about the wide-scale use of pesticides. He recommends that full details should be given on each big control program and, if calculated risks are to be taken, the public should be informed.

In a 1957 report of present knowledge of pesticides prepared for the Conservation Foundation of New York and the New York Zoological Society, Dr. George reviewed the pesticide program, the economic and agricultural reasons for its tremendous growth, and the past findings of the effect of pesticides on flora and fauna. The 57 page booklet is entitled "The Pesticide Problem."

Dr. George said that there are many field variables to be considered in evaluating the effects on wildlife of any specific program, but in general, fish mortality will be noted at applications in excess of 0.25 pounds per acre. DDT is less toxic to birds; ordinarily, little field damage is reported at concentrations less than two pounds per acre and with mammals normally there is little change in populations until the application rate exceeds five pounds per acre. Emulsions are the most toxic, and wettable powder suspensions the least toxic to fish and aquatic life.

On the other hand, Dr. George reports, acute toxicity following a single application is not the only effect. Sublethal doses may lead to a decrease in the number of eggs laid, a low rate of hatching, and a poor percentage of fledgings. Furthermore, it is suggested that the animals which do live might have low reproductive rates. The report states that very few herbicides produce acute toxicity under ordinary conditions of use but many of them can alter habitats. In some cases, this ability can be used as a management tool to change habitats to those most productive. The chronic effects of herbicides on populations, if any, are unknown. Fungicides have had less direct toxic effects on warmblooded animals than herbicides or insecticides.

Dr. George suggested a program of action for the Conservation Foundation and the New York Zoological Society in his report. He recommended a balanced research program of laboratory and field work to compile ecological information on long-term effects on wildlife populations especially at sublethal doses. He said that at the present time our knowledge is such that generalizations are very difficult to make.

The evaluation program recommended is concerned with value judgments. Dr. George said that there is reason to believe that some of the large-scale area spray operations are not very effective in their primary objective and suggested that an evaluation team be set up to consider objectively some of these large-scale applications.

The Conservation Foundation and New York Zoological Society were urged by Dr. George to stimulate the various research agencies to conduct long-term ecological studies of populations on treated and untreated areas. Also, Dr. George continued, a private objective organization might ideally set up an evaluation committee which would review major aspects of the pesticide program and render value judgments as to the economic merits or wisdom of those programs. This evaluation committee probably would be able to point out gaps in our knowledge, where more information is needed to make sound judgments. He suggested that the organization of a conference to delimit the state of our knowledge of the effects of pesticides on wildlife is one of the most promising undertakings which this evaluating committee could launch.

In his review of past findings, Dr. George said mortality of birds has occurred in large-area field applications of DT at one pound per acre because it is very difficult to obtain an even coverage of toxicants when applied by airplane. In the early days, in 1945, it was noted that dosages of up to 15 pounds per acre were obtained in local areas of a general tract being spread at a rate of one pound per acre. The report cited recent studies which show that yearly applications at the two pound per acre level reduced song bird populations by as much as 26 per cent after five years.

Early studies that have shown that mammals can tolerate applications of five pounds of DDT per acre or more without acute intoxication have indicated a sufficient margin of safety in the field and as a result few recent studies have been conducted on mammals.

Dr. George pointed out the problems of insect resistance and the differential effects on various arthropod groups of pesticides which may leave a particular insect pest untouched while destroying its normal predators. He likened the use of pesticides to the use of anti-biotics. Although its use may be a great value, one runs the danger of creating forms that are

(Continued on Page 117)

The National Audubon Society Comments on THE PESTICIDE PROBLEM

THE National Audubon Society has gone on record as opposing "all insect control programs in which highly toxic chemicals are broadcast unless incontrovertible evidence becomes available that no serious damage to human and wildlife resources will result." This stand was taken following the recent annual convention of the Society held in New York City, Nov. 11th, 1957. At the meeting a number of property owners around the tri-state area of New York, New Jersey and Pennsylvania, sprayed last summer in the U.S.D.A.'s gypsy moth eradication campaign, testified to damaging effects to wildlife, domestic animals, milk supplies, etc., which they attributed to the spray program.

The Society has specifically requested that the Secretary of Agriculture order the suspension of the proposed control program for the imported fire ant on 20 million acres of land in nine southern states, charging that widespread application of highly toxic pesticides "carries with it much higher potential of harm to human beings and wildlife than is generally recognized." They take the position that, in any case, the burden of proof is on the agencies undertaking such spray programs to show that there is no risk of serious after-effects. "The burden of proof should rest on the agency employing the toxic substance, and not on the individual citizen," said John H. Baker, president of the society.

With specific reference to the fire ant control program, which is currently getting under way, the Society takes the position that the chemicals proposed for use (specifically dieldrin) are far too lethal for widespread aerial or ground application.

"The National Audubon Society recognizes the seriousness of the fire ant problem," said Mr. Baker. "We can well understand that citizens of the affected states are eager to have this troublesome insect controlled But we doubt very much that they would be eager to have their countryside doused with these lethal chemicals if they knew the extent to which they, their livestock, and those that consume the crops produced in the area may suffer."

The Society recently released the stenographic account of remarks made by Dr. John L. George, associate curator of mammals, New York Zoological Society, before the November meeting. He reported that in area spraying projects possible damage to wild life can range all the way from minimum to heavy effect, depending on operational control. In general, fish and aquatic life and other cold blooded forms are more susceptible than the warm blooded forms. With applications in excess of .2 lbs. per acre some mortality is possible, and certainly at .5 lbs. per acre some mortality will result. At one pound per acre, the normal rate used in gypsy moth control, Dr. George advised that there should be essentially "no effect" on adult bird population. He suggested, however, that there might be other secondary effects on number of eggs laid, eggs that hatch and hatchlings that survive. "If you use one or two pounds of DDT per acre," he summarized, "I would presume you would get some bird mortality. I would presume there would not be any readily apparent mammal mortality in the area. On the other hand, when you get up to about four or five pounds per acre, you will eliminate mammals."

(Editor's Note: None of the control programs call for this high a treatment, and such a concentration could result only from inefficient control and excessive repeat applications.)

The speaker referred to the economic necessity for the use of pesticides, saying "it is alleged that around $11 billion dollars a year are lost in food and forage to insects. The Forest Service tells us that they lose more timber to insects and disease

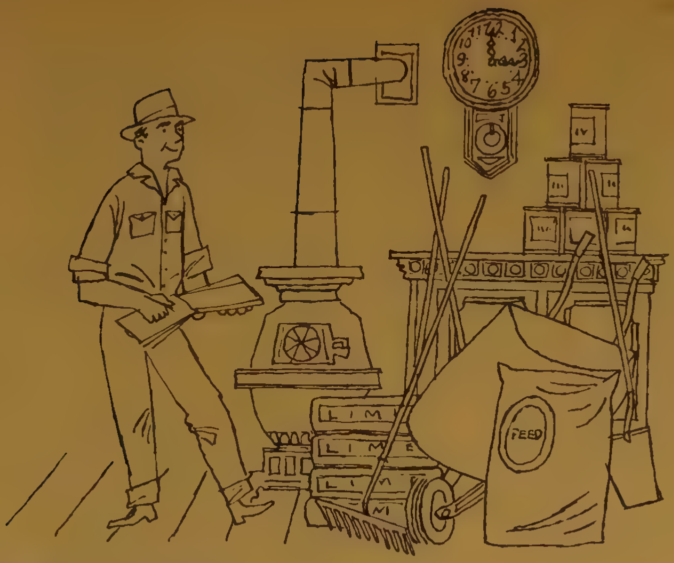
(*Continued on Page* 117)

What Should the Dealer Know about Fertilizers?

In an expanding industry such as agricultural chemicals, it is sometimes easy to lose sight of the fact that not everyone is thoroughly familiar with all phases of the materials we deal with: insecticides, fertilizers, herbicides, fungicides, plant growth hormones, equipment, etc. It seems logical therefore to renew a series of articles published some 10 years ago in *Agricultural Chemicals* on what the dealer should know about each of the products of our industry.

The first in this completely new series, starting on the facing page, concerns fertilizers. It is of an elementary nature, and will provide basic information not just for the dealer, but also for the newcomer to the industry. It should be a very helpful article for salesmen, fertilizer buyers etc. The article together with others dealing with other phases of the industry, will be reprinted, and available to our readers.

What the DEALER should know about FERTILIZERS



Part 1.

by A. W. Mehring
Hyatsville, Md.

MANY fertilizer buyers have taken courses in agriculture or have had satisfactory experience in using fertilizers. Selling to such customers offers few problems, provided the dealer has the kind of fertilizer that they want. On the other hand, many persons do not understand the principles involved in the use of fertilizers, or may be dissatisfied with past results. Also each year many people start using fertilizers for the first time. Such buyers need help and usually ask a lot of questions. The dealer who can give sound advice about the use of fertilizers and answer questions correctly will find this profitable in the long run.

About 20 million tons of fertilizers are used annually by farmers and roughly 2 million tons by nonfarm users, such as highway departments, parks, cemeteries, golf courses, and home gardeners. This article is intended to help the dealers who sell these fertilizers to give their customers correct information. Only general principles can be given in this article. Sources of further details that apply locally will also be suggested.

Types of Dealers

A number of different types of retail dealers sell fertilizers in most communities. They may be classed as follows:

I. Manufacturers.
II. Farm supply stores.
III. Liquid fertilizer distributors.
IV. Agents with no stocks on hand.
V. Building supply and lumber dealers.
VI. Hardware and general stores.
VII. Garden supply and seed stores.
VIII. Nurseries and florists.
IX. All others.

To a considerable extent the class of consumer patronizing each type dealer is different. The kinds of fertilizers sold also differ somewhat. It will help therefore to understand what these differences are.

Manufacturers sell principally to wholesalers, or to the other types of dealers listed here. But many of them nevertheless sell to any one able to buy a ton or more at a time.

Class II consists of merchants carrying many kinds of supplies for farmers. They usually are agents for one or more manufacturers for their area. While catering primarily to farmers, they will generally sell as little as one 80 pound bag to anybody.

Liquid distributors may handle anhydrous ammonia, aqua ammonia, nitrogen solutions and/or liquid mixed fertilizers. Many of them are fuel dealers. They distribute liquid fertilizers in order to keep their drivers and trucks busy during periods of the year when their other business is slack. Liquid dealers must usually have expensive equipment and most of them also apply their products directly to their customers' land. They have problems not encountered by other types of dealers, and which cannot be discussed here. The liquid dealer can, however get help with these problems from his manufacturer.

Agents who carry no stocks take orders from friends and neighbors until they accumulate enough tonnage to buy at wholesale. Such dealers must arrange for prompt delivery when the truck or car arrives from the factory. Some of these agents work among farmers, and others among suburbanites.

Class V includes dealers who sell largely to builders and contractors. Builders find it convenient to buy the fertilizers required in landscaping on the same charge accounts where they buy their other supplies. These dealers usually handle only the grades used on turf in 80 or 100 pound bags.

The remaining classes of dealers sell almost entirely to home owners or other small scale non-farm users. Dealers in class VI to VIII, inclusive, customarily sell both farm-grade and specialty fertilizers.

The all-other class includes department, dime, drug, and grocery stores. As a rule, such stores handle only specialty fertilizers, and most of them only during the active season of the year. Their clerks in many cases know nothing about the use of fertilizers, and customers of such stores have to depend upon the labels on the packages.

Nutrients

ABOUT 15 chemical elements are required in plant nutrition. The structure of plants is composed largely of only three, which are carbon (C)*, hydrogen (H), and oxygen (O). These elements are easily obtained by plants from air and water, and are never applied as fertilizers. The others are generally obtained from the soil and if not naturally there in sufficient amounts must be added in the form of manure or fertilizer in order to get satisfactory crop yields.

The quantities of nutrients removed from an acre of soil by a crop of the size shown are indicated in Table I. The quantities given do not include those in stalks, vines, roots, or other plant residues that are normally returned to the soil. All crops need nitrogen (N), phosphoric oxide (P_2O_5), and potash (K_2O) in relatively large amounts. These primary nutrients are often deficient, in forms available for satisfactory crop yields. When all are deficient, an N-P-K fertilizer, such as 5-10-10, 4-12-12, or 10-10-10 should be used.

The legumes (peas, alfalfa, clover, soybeans, vetch, etc.) when properly grown, are able to obtain their nitrogen from the air. Normally P-K fertilizers are therefore used with legumes. Such fertilizers contain guaranteed amounts of P_2O_5 and K_2O, but no nitrogen. Typical are the 0-14-14 or 0-20-20 grades of mixed fertilizers. Legumes require more calcium and boron that most other kinds of plants. More will be said later about how to obtain information on the kind or quantities of nutrients to use for specific crops and soils.

Considerable amounts of calcium (Ca), magnesium (Mg), and sulfur (S) are also needed by most plants. Ca and S occur as necessary constituents of several widely used commercial fertilizer materials. Ca and Mg are major constituents of most liming materials. Nearly all fuels contain sulfur. When large quantities of gas, oil, or coal are burned in a community, the air and soil for many miles around are apt to contain enough for crops. Where soils are not limed regularly, Mg is apt to be deficient. Ca, Mg and S are known as the secondary nutrients.

The remaining nutrients listed in Table I are needed only in minute amounts, and are known as trace

TABLE I

Approximate quantities of nutrients removed per acre of soil by growing certain crops.

Nutrient and its symbol	Corn 100 bu. lbs./A	Wheat 40 bu. lbs./A	Alfalfa 4 tons lbs./A	Potatoes 400 bu. lbs./A	Cotton 1500 lbs. lbs./A	Sugar Beets 15 tons lbs./A	Tobacco 1500 lbs. lbs./A
Nitrogen, N.	90	50	180	80	40	60	55
Phosphoric oxide, P_2O_5	35	25	40	0	20	20	10
Potash, K_2O	25	15	180	150	15	50	80
Calcium, Ca.	6	1	112	3	2	35	54
Magnesium, Mg.	6	6	21	6	4	24	13
Sulfur, S	7	3	19	6	2	10	10
Copper, Cu.	0.04	0.03	0.06	0.04	0.06	0.03	0.02
Manganese, Mn.	.06	.09	.44	.09	.11	0.75	.30
Zinc, Zn.	.10	.14	.42	.05	.32	....	.05
Boron, B.	....	....	.06	.05	....	....	.05

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*The letters in parenthesis are the chemical symbols. The symbols of the one guaranteed in fertilizers, are printed on tags or labels, in the fertilizer laws, in experiment station publications and in other places. Their meaning therefore should be understood by the dealer selling fertilizers.

nutrients, or minor elements. Molybdenum (Mo) and possibly a few others are required, if at all, in even smaller amounts. Most soils contain enough. Neutral or alkaline soils, especially if they are high in organic matter are apt to be deficient in available copper, manganese, and zinc.

Chlorine (Cl), silicon (Si), and sodium (Na) are generally present in plants in minute amounts. Little evidence exists to prove that they are essential, but under certain circumstances applications of one or the other appear to be beneficial to certain crops. On the contrary too much chlorine or sodium is harmful. The amount of Cl permissible in tobacco fertilizers is limited by law in some states.

A deficiency of only one necessary nutrient limits crop production, even though all the others may be available in adequate amounts.

Terms and Regulations

FORMERLY nitrogen was guaranteed in terms of ammonia (NH_3) and the other nutrients as oxides, such as CaO, MgO, SO_3 CuO, etc. In 1953, the Association of American Fertilizer Control Officials adopted the following regulation: "All fertilizer components, with the exception of potash (K_2O) and phosphoric acid (P_2O_5), if guaranteed, shall be stated in terms of the elements." All guarantees of nutrients must be in whole numbers.

The custom of calling P_2O_5, phosphoric acid, began more than a century ago. At that time it was believed that P_2O_5 was the correct formula for the acid. Many state laws require that phosphorus shall be guaranteed in terms of P_2O_5. Nevertheless it is now well known that the correct formula for phosphoric acid is H_3PO_4. This formula indicates that the phosphate ion is composed of one atom of phosphorus and four atoms of oxygen with three atoms of hydrogen. Real phosphoric acid solutions are widely used as fertilizer materials by manufacturers, and to a lesser extent as direct fertilizers on alkali land or in irrigation water by farmers. It is necessary to guarantee the strength of these solution in terms of P_2O_5. It is therefore becoming general practice to call P_2O_5 phosphoric oxide, to distinguish it from phosphoric acid (H_3PO_4).

The fertilizer grade represents the minimum guarantee of its plant nutrients expressed in terms of percentages of nitrogen, available phosphoric oxide, and water-soluble potash in that order, as for example 5-10-10 grade. The analysis represents the quantities found to be present by chemical analysis, such as 5.15-10.53-10.37. The differences between the guarantee and analysis are known as overruns or underruns. In this case the overruns would be: 0.15%N, 0.53% P_2O_5, and 0.37% K_2O. All reputable manufacturers aim to give small overruns, because state laws impose penalties for failure to maintain the guarantee, which must be plainly printed on every label or tag.

A unit of nutrient is one percent of a ton, or 200 pounds.

The term "organic" when applied to the source of a fertilizer nutrient shall include only organic substances that are insoluble in water. Thus urea and cyanamides, although organic chemicals, may not be called organics in connection with the sale of fertilizers.

The Federal government has no laws regulating the sale of fertilizers, but every state does. Every dealer should know the requirements of his state. These are too numerous for inclusion here. A copy of the law may be obtained free from the Fertilizer Control Official whose address is given in Table II. (See Pages 118, 119).

Both the Federal Housing Administration and the Veterans Administration, before insuring any loan on a new building, have a minimum requirement that lawns and shrubbery must have received the equivalent of an application of at least 25 pounds per 1000 square feet of a commercial 4-8-4 fertilizer. Each state F.H.A. office has the authority to increase these minimum requirements. Some do specify 5-10-5, or some other grade, as a minimum.

The average suburban lot contains about 6000 square feet that should be fertilized, although many contain smaller and a few much larger planted areas.

Availability

Nutrients are considered to be available when soluble in water, or capable of being easily rendered so in the soil during a current growing season. The latter can be demonstrated only by trial in the soil, which requires much time and effort. So chemists have developed methods by which availability can be tested in the laboratory in a few hours. The values obtained are rough indications of what would happen with a crop in the field.

All the nitrogen in a substance that decays readily in the soil is available. Thus the insoluble nitrogen in cottonseed meal, dried blood, animal tankage, bone meal, tobacco stems and similar materials is all slowly available. Ureaform is an insoluble chemical that when properly made becomes available even more slowly than natural organics. It can only be distinguished, however, from ground plastic scrap by a chemical test. Plastic scrap, ground feathers, leather, wool, silk, horn and similar materials, even though they contain a high percentage of nitrogen, are worthless as a fertilizer unless treated in a suitable manner. The nitrogen in such materials must be steamed at high pressures or treated with sulfuric acid before it becomes available.

In a hot moist soil available organics rot completely within a few weeks. Urea-form by contrast lasts a whole season. For long season crops fertilizers containing both water-soluble and available water-insoluble forms produce better results than those containing only water-soluble kinds.

Nitrates are more quickly leached out of soils by rain than other forms of nitrogen, but all available forms are converted to nitrates by soil organisms, if conditions are favorable.

Under water-logged or other reducing conditions nitrates may be converted to nitrites. The latter are poisonous to plants. Under reducing conditions plants use ammonia nitrogen and therefore ammonium sulfate or phosphate are preferred forms of fertilizer for rice, or any other plant grown under swamp conditions.

All the P_2O_5 of bone and other organics is considered available. The available P_2O_5 of superphosphate and mixed fertilizers is the sum of the water-soluble and neutral ammonia citrate-soluble portions. That of basic slag, metaphosphates and fused phosphates is the part soluble in two-percent citric acid solution.

All the K_2O soluble in water or in a solution of ammonium oxalate is available. This includes that of wood ashes and all natural organics, but excludes that of most natural rocks.

Kind of Fertilizer

EVERY dealer knows that he should carry in stock the kinds of fertilizer that his customers will need and that he should buy only what can be sold during the current season. Nevertheless it may be quite difficult to meet fully these requirements for success.

Changing economic conditions, new discoveries, and other factors cause the local authorities to change their recommendations and the consumer to alter his practices. The successful dealer must try to keep informed of these changes. He will then have what his customers want and be in a position to give them sound advice, when they ask for it. Otherwise, his shelves may get loaded with goods that are hard to sell, or if he does not have on hand what the customer wants, he may lose business to a competitor who does.

Past experience is of value in ordering mixed fertilizers for the future, but, nevertheless, it is wise to consult the county agricultural agent at the county seat, or the state agricultural experiment station at least once a year before doing so.

More than a thousand different grades of mixed fertilizers are sold in the United States. Only a few, however, are important in the trading area of any one dealer. Thus it is impractical to list them here. The Agricultural Research Service of U.S.D.A. publishes annually a report on the quantities of the principal mixed fertilizers and materials sold in each state during the previous season. This report is reprinted annually in the June number of this magazine. A study of that consumption report will help the dealer keep abreast of changes in usage that are occurring in his state.

Consumption for the latest available year is shown in Table III. This shows the relative importance of the various kinds of fertilizer materials for the country as a whole. It may be helpful in deciding which materials to carry in stock. (Table III appears on Page 121).

Every dealer should have on hand at least one kind of each chemical fertilizer: nitrogenous, natural organic, phosphatic, and potassic fertilizer in addition to various commercial mixtures. This is important. Although a majority of customers will want mixed fertilizers, many will want various separate materials for special purposes. If a customer has to go elsewhere to buy, for example, ammonium nitrate or superphosphate, he is apt to buy other things there also.

Most state experiment stations now make quick soil tests for their citizens, and as a result advise certain treatments for growing the plants specified by the owner of the land. Many thousands of tests of lawn soils annually result in recommendations that one to three pounds of nitrogen be applied per 100 square feet. Many home owners whose soils need nitrogen find that their dealer carries mixed fertilizers only. Under such circumstances they may be sold, for instance, 10-6-4 or some other mixed fertilizer relatively high in N. Such a sale, however, results in ill will, and possible loss of a customer.

In general any single primary nutrient material listed in Table III may be substituted for another under the same heading as a plant food, provided allowance is made for differences in composition and price. Each one nevertheless, has advantages and disadvantages of its own, such as ease of storage and handling, presence of other nutrients, effect upon the soil and others, as previously explained. If these facts are understood by the dealer and explained to the customer, the latter is often willing to accept what the dealer has, rather than what he asked for. If the dealer has selected his stock wisely, it may be much better for the customer this way.

Unit Costs

THE average retail prices of the principal grades of mixed fertilizers and material in each state are published twice a year in "Agricultural Prices," a monthly magazine issued by the Crop Reporting Board, U.S.D.A., Washington, D. C. If these prices per ton are divided by the percentage of the nutrient that the material contains (Table III), one gets the price per unit.

This is a convenient measure of comparative prices. For example, a few retail prices from the September 15, 1957 quotations and the computed unit prices follows.

Kind	*Retail Price*	
	$/Ton	$/Unit N
Anhydrous Ammonia	151.00	1.84
Ammonium nitrate......	80.80	2.41
Ammonium sulfate......	59.30	2.85
Sodium nitrate..................	59.80	3.71

These are national averages. Local prices may differ considerably, but they will show that ammonia is the cheapest form of N, even though it costs more per ton. Being a gas, it must be compressed into a liquid and stored and handled in expensive equipment. Aqua ammonia and nitrogen solutions are more expensive per unit of N than anhydrous ammonia, but cheaper in general than solids. They are also intermediate in some other characteristics. Dealers catering to the home and garden trade will find that only the solid forms are practical for them, unless they are prepared to apply the liquid for the customer.

The most economical form of K_2O in most areas is potassium chloride, formerly known as muriate of potash.

(Part 2 Next Month)

Deteriorated condition of forest growth a few years following mortality of the trees due to repeated defoliation by the gypsy moth. USDA photo.

Control of Forest Insects

Based on a report by James A. Beal, director, Division of Forest Insect Research, Forest Service, USDA, and presented at the Indianapolis meeting of the American Association for the Advancement of Science, December 28, 1957.

FORESTS in the United States occupy more than 650 million acres—approximately one-third of the land area—and are the source of income for one person in eight. Recent surveys continue to show that timber requirements are increasing, but that wood quality is falling off . . . putting more pressure on programs to preserve and improve our forest reserves.

Adequate protection against insects is becoming more and more a vital part of successful forestry programs. And, fortunately, interest in control of forest insects has increased markedly during recent years. Timber owners are no longer willing to accept insect-caused losses as inevitable, but are willing and anxious to do something about them. State forestry offices have added forest entomologists to their staffs . . . an increasing number of private forestry companies use the services of trained forest entomologists . . . states and timber companies are cooperating on aerial surveys, etc.

Forest insect control is not entirely dependent on the use of chemicals. Much can and is done toward minimizing certain types of insect losses through the application of silvicultural and management practices. Biological control also has its part in the forest pest control program. A virus disease organism was recently used to effectively control the European pine sawfly, and is currently being used in eastern and central states to control European pine sawfly infestations in red pine plantations. Further work along all means of control is of course required—and for the time being control of forest insects will have to continue to rely heavily on the use of chemicals. Greater use of silvicultural, biological, or other preventive control measures will come only as rapidly as research can discover them, demonstrate their value and develop methods for their effective application.

The following summarizes some of the chemicals currently used in forest pest control programs:

Control of forest insects through the application of insecticides is by far the most common method of direct control in use today. The synthesis of more effective chemicals and the development and improvement in equipment and methods of applying them are largely responsible for their widespread use. Among the more important recent advances in this type of control of forest insects has been the use of the airplane for the distribution of concentrated sprays, such as DDT, from the air. During the past 10 years, research has gathered considerable information on dosages and formulations, and on the atomization, distribution, and application of aerial sprays. Furthermore, it has helped develop effective guide lines for operational procedures. Today, as a result, aerial spraying to control many forest insect defoliators is widely practiced in both the United States and Canada. In fact, nearly 15 million acres of spruce budworm infested forests have been treated from the air in the United States and Canada during recent years. Outbreaks of the Douglas-fir tussock moth, white pine butterfly, hemlock looper, pine looper, gypsy moth, forest tent caterpillar, Saratoga spittlebug, the walkingstick, some sawflies and other defoliators, have also been controlled by aerial spraying.

Some of the newer chemicals are also being used widely in the control of bark beetles, insects not amenable to control from the air, particularly in the West and in the South. Ethylene dibromide emulsions, for example, are largely replacing older insecticides for the control of the Engelmann spruce beetle, the Black Hills beetle, and the mountain pine beetle. The habit of —

See page 115

Developments in the

by
Vincent Sauchelli*
Chemical Technologist
National Plant Food Institute

THE prime interest of chemurgists is the encouragement of agricultural and chemurgic research. As Wheeler McMillen, president of the Southeastern Chemurgic Conference, has reiterated, "research is the most effective and the cheapest form of farm relief. It gives cheaper production, better products, real profits and lasting advantages, new markets, new uses, new crops and new customers; new wealth instead of new taxes; lasting solutions rather than the perpetuation of old problems." Legislative solutions are temporary at best, costly and seldom successful. It is the duty of every one of us, devoted to the best interests of agriculture, to drive home at every opportunity the benefits of research.

We have in our country, I regret to say, persons of apparent intelligence and recognized influence in molding opinion who ascribe many of agriculture's present ills to the results of scientific research. American agriculture has had a bad press and many good people in our nation look upon it as a decadent industry. Farm people are migrating from the farm and the number of farms is declining. However, American agriculture is still the largest privately owned business in the world.

Of the 62 million gainfully employed workers in the country, 10 million work on farms, 6 million manufacture and sell farm production supplies, an additional 9 million are in process and distribution services. This means about 40 per cent of the nation's workers are associated with agriculture. This vast, basic industry should not be sold short.

How do all these considerations tie in with developments in fertilizer? There is a close and direct relationship as I shall try to show you. Let me start out with the simple proposition that if the people of this country want to continue to better their standard of living, they must solve the problem of how to produce more. And the best way to produce more is to improve and expand facilities for production.

Ah, say the pessimists, but that leads to overproduction. Look at the surplus crops we are already burdened with. To advocate an increase in crop production is foolhardy. These same worriers argue that the improved technologies we advocate, which enable man to produce more with less human labor, will create not abundance but unemployment. History and our own experience refute such argument. Technological advancement in the long run creates increased employment opportunities. Consider, for example, the vast employment opportunities that accompanied the invention of the automobile which displaced the wagon building industry.

Our need is not the status quo in research and development, not fewer technological advances, but rather improved methods of production. With a population expanding at the rate of 2½ million a year, we must learn how to produce more of everything more efficiently to satisfy the needs of our people in their quest for a higher standard of living.

The history of our agriculture is a case in point. In 1800 to produce food and other farm crops for the country it required nine men out of ten of the population. Only one person out of ten could devote himself to the production of the other necessities and luxuries of life or to education and other pursuits of cultural value. Today, one man on the farm produces enough food for himself and 19 others!

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*From a talk given at Southeastern Chemurgic Conference, Lakeland, Fla., November 13, 1957.

Fertilizer Industry

What an advance that is. It means that in our country millions of people can devote themselves to work in other industries, because today's agriculture depends not on the inefficient muscle power of man and beast but on electricity, gasoline, mechanical facilities of all kinds and on agricultural chemicals; that is, fertilizers and pesticides.

The modern farm is largely a mechanized project employing the latest developments of science. For example, a typical farmer in the Midwest using power machinery, and assisted by but a single farm hand, can farm at least 400 acres. To farm such acreage 40 years ago required at least 5 men and about 20 horses or mules, and they did a much poorer job in every respect. A survey conducted by the University of Illinois reveals that in the past 25 years the average number of acres tilled by one man has increased from 113 to 149, while the average yield of corn per acre has increased 37 percent, soybeans, 74 percent, and wheat, 41 percent. Since the beginning of World War II, American farmers have increased their total production by 35 percent without increasing acreage, and the output per man-hour of labor has nearly doubled.

As the pattern of farming changes, fertilizer practices change with it. About 50 years ago most farms in the U.S. depended solely upon their own resources. Livestock on the farm provided what supplementary fertility the soils required; commercial fertilizers were used by tobacco and cotton farmers, but sparingly. As previously noted, modern farms are for the most part commercial, and are assuming increasingly the characteristics of manufacturing business. How to lower the unit cost of production becomes an ever-present challenge to the manager.

The commercial fertilizer industry has shown farmers that increasing the output per acre through the judicious use of fertilizer is one of the most effective means of lowering unit cost. The indispensability of fertilizer in modern farming cannot be ignored. If commercial fertilizer suddenly becomes unavailable, production of many farm products would be seriously curtailed.

It is estimated that fertilizers are responsible, on the average, for about 30 percent of the country's farm production. To produce this quantity of farm products without the use of fertilizer would require, it has been estimated, about one hundred million acres of good farm land. Since new crop land, generally, is no longer available, or at least not in such dimensions, and since more crop production will be needed in the future to meet rising population demands, it is evident that the fertilizer industry must be depended upon to serve American agriculture and the public in a very essential manner.

The fertilizer industry has faced serious obstacles over the past decade in its job of serving American agriculture. For example, those farmers who use about 90 percent of the marketed fertilizer received less net income during 1956, last year of record, than in any of the previous 15 years. Net farm income has been declining for some years. At the same time the price-supported crops, including tobacco, which use more than half the total plant nutrients sold in the United States, are in surplus. Such a combination of circumstances is most discouraging, and yet despite it all the fertilizer industry has improved its technology and greatly expanded its productive capacity.

Perhaps such expansion may seem unwise. How can we expect to sell more of our products when net farm income is decreasing and surpluses of major crops are increasing? Some persons even blame our industry for the surpluses. Well, we have faith that the surplus problem will be licked and that farmers even under today's economic dilemma can, by properly using fertilizer, get more net income from the marketing of their products.

Sound soil management practices combined with optimal rates of fertilization will reduce unit costs of production. Profit equals sales minus production costs. I need not belabor the point. This management factor is almost a truism. It seems to me much too much attention has been focused on the surpluses and the cost to the public of the support program. Has it occurred to consider such money paid to farmers as a profitable investment for the consuming public.

The price support program costs about five billions a year: true. But, if the cost of today's food basket is compared with the cost of the same amount of food twenty years ago, it is easy to realize what a big bargain in food the average American family is enjoying. Food prices at the farm have not increased commensurably during the past decade with other products the family buys. In the case of fertilizer, the farmer is getting the big bargain. Since 1939 all products the farmer purchases have increased in cost by 129 percent, whereas fertilizer has increased a bare 13 percent.

Research resulting in new technologies in the fertilizer factory, more efficient methods of production, new types of fertilizers—liquids, granulated—improved services to the farmer have combined to bring about a more favorable production cost on American farms. The farmer has benefitted. He is getting his share of the 20th century standard of living: good communication, electric power, modern technology, fair return for his labors, good roads, speedy transportation; in fact, he enjoys everything his city brother has. Not all of these benefits are due to fertilizer, of course; but we do insist that, without the use of fertilizer, the farmer could not possibly have realized a large share of these favorable factors comprised in a good standard of living.

Research on the farm, the remarkable application of modern improved technology on our croplands has meant huge savings to all sections of the economy—rural and urban. Dr. Byron T. Shaw, USDA, recently declared that the improved technology on American farms applied during the past two decades is enabling the nation's housewife to save at least $10-22 billion annually on her food bill. Thus it seems reasonable to point out that the application by American farmers of the results of scientific research to farm problems has tremendously benefitted the food and fiber consuming public.

An added plus value accompanying the farm support program is a substantial reduction in the consumer's food bill.

The public, in a way, is enjoying a sort of subsidy to the food bill. The increased efficiency developed on American farms is translated as just noted to a $10-12 billion contribution to the nation's annual food bill. Isn't it fair to describe this as a return to the taxpayer on his investment in support prices? Perhaps this is not strictly according to Hoyle economics. But, we know the price support programs cost about $5 billions annually. To buy and store surplus farm products cost an additional $2½ billions a year. The $10-12 billions which the consumer saves on his food bill as a result of the improved, more efficient methods of farming will pay for twice the entire USDA annual appropriations.

Along the same line of reasoning, we may cite the benefits to the general economy of the improvements in technology and materials of the fertilizer industry. Economists in the USDA have established that the increased usage of plant nutrients on crop soils since 1939 has saved the American housewife at least two of the $10 to 12 billions annually in her food bill. That is to say, if American agriculture were using today commercial fertilizers at the same limited rate which prevailed in 1939 the average cost of food would be higher than it is at present by some $2 billions. Fertilizers help create food and fiber abundance.

Further, if the average cost of a ton of fertilizer at present had risen since 1939 at the same rate as other commodities bought by the farmer, the annual fertilizer bill would be about $1¼ billions higher. This higher cost would, as in other industries, be passed on to the consuming public. May we not say that this annual saving to the farmer and indirectly to the public, brought about by improved technology and management in the fertilizer industry, is to be considered its contribution to our national welfare?

These savings which research has enabled both farmer and consumer to enjoy represent an amount in excess of the cost of the surplus crops to the taxpayer. The taxpayer should be told this other side of the story about farm surpluses in order that he may appreciate that the so-called agricultural subsidy is not a one-way street.

Since chemurgy is primarily interested in the profitable utilization of farm products for other than food and feed uses, that is, for industrial purposes, let me suggest these considerations: Industry will be interested in the utilization of any farm product if the economics are favorable. The price must be right, competitively on an equivalent basis. Unit cost is an important factor. Therefore, any research that leads to a lowering of the unit cost of production is always in order.

The fertilizer industry believes its products, properly used in farm management, are indispensable factors for reducing the unit cost of crop production because they can increase the output per acre and per man-hour of labors. Hence, the relationship of commercial fertilizer to ultimate acceptance of farm crops for chemurgic purposes. For these reasons, development in the fertilizer industry are of interest to chemurgists and vice versa. We have common interests and a common purpose.★★

●

Kinetin Effect on Plant Growth

Investigations concerning inhibition of plant growth by root-drench applications of kinetin show that as the dosage of kinetin is increased, the growth of the tomato plants is strongly inhibited. Plants treated with 100 ppm of kinetin had small, atypically shaped leaves, drastically reduced root systems, and purple pigmentation similar in appearance to that associated with phosphorus deficiency. They often exhibited loss of vigor on warm days. The plants flowered approximately 2 weeks later than the control plants and produced flowers and fruit of reduced size. Although the fruit was small, seeds harvested from them were viable and produced normal seedlings.

H. T. Kemp, R. G. Fuller, R. S. Davidson, *Science*, Dec. 6, 1957, Vol. 126, No. 3284, page 1182.

DDVP

guthion

nialate

trithion

delnav

thimet

WHAT'S NEW IN INSECTICIDES?

by Clyde Smith*
North Carolina Agricultural College
Raleigh, N. C.

WHEN I was first asked to discuss what's new in insecticides, I was left in a quandary as to just where to begin; however, after some meditation I decided you would be most interested in the "new" materials we are placing in our recommendations for the coming season and some of the materials that may be recommended within the next year or two. Therefore, I shall first discuss some of these materials and then briefly indicate where they are recommended.

The following materials are in our recommendations this year for the first time. Other materials are recommended for new uses and will be discussed later.

METHYL PARATHION (Shell Chemical Co., Chemagro Corp., Victor Chemical Co., Monsanto Chemical Co., American Cyanamid Co. and others.) This is another phosphate which is quite toxic to warm-blooded animals, as well as a large number of insects.

GUTHION (Chemagro Corporation). This material is a phosphate. It is quite toxic to mammals, but looks as though it might have quite wide usage. It is recommended only on cotton.

TRITHION (Stauffer Chemical Co.) is another phosphate which is similar or Guthion and methyl parathion in toxicity to mammals. It was especially good on mites on cotton and is being recommended this year. It is especially good as a dust.

NIALATE (Niagara Chemical Co.). This is another phosphate similar in toxicity to Guthion, methyl parathion and Trithion. It is being included in our recommendations this year.

The following materials are being used experimentally, and in some cases the company has obtained label approval for their use against certain insects. We anticipate that they may be included in our recommendations in the next year or two.

PARATHION (American Cyanamid Co.). This is not a new material, but it is a commonly used phosphate and is included in order to show the relative toxicity of the various materials.

THIMET (American Cyanamid Co.). This is a phosphate which is about like parathion in toxicity to mammals. It is a very interesting material in that it is a systemic. It can be applied to seeds and it will control insects for several weeks. This is especially true of aphids and mites. It has also shown some value in the control of overwintering boll weevils. We thought it would solve some of our problems with cotton insects until Dr. Mistric showed it would reduce and delay fruiting of the cotton plant under certain conditions. The damage is most noticeable under conditions of abundant rainfall during July and August. This results in a delayed fruiting and also in a reduction of blooming of the cotton plant.

DELNAV (AC528) (Hercules Powder Co.). This is a phosphate which is showing promise in control of mites as well as many other pests, especially on fruit.

*A report presented at the meeting of North Carolina Seedmen, February 11, 1958.

This story on the new pesticides serves as an introduction to a summary on each of the new pesticides which will appear in the April issue of *Agricultural Chemicals.*

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PHOSPHATE MINES AND PLANTS IN FLORIDA AT NORALYN, PEACE VALLEY, ACHAN, MULBERRY; IN TENNESSEE AT MT. PLEASANT, WALES AND GODWIN

DDVP (Norda Essential Oil Co. and R. W. Greeff Co., both of N. Y.) This is an organic phosphate which may act as a contact insecticide, or as a fumigant. It is quite toxic to warmblooded animals, but can be used safely because of the small amount necessary to kill the insect. It probably will be used quite extensively this year in the control of cigarette beetles in tobacco warehouses.

Dow ET-57 (Dow Chemical Co.). This is a phosphate used as a systemic for the control of cattle grubs. This is an example of the use of insecticides as systemics to control insects, mites, and ticks that feed on mammals. Dow ET-57 is one of the first of these to approach the stage of being recommended. Other materials are showing promise (experimentally) for the control of buffalo gnats, mosquitos and horse flies.

Dipterex (Chemagro Corp.). This is another phosphate which is relatively safe to mammals and will control a wide variety of insects. It has a short residual life, and shows promise against hornworms, forage pests and boll weevils.

Malathion is used on animals, anamid Co.). Malathion is not exactly a new material, but it is being recommended for a great many more uses this coming year. It probably comes the closest to being an "all around" insecticide of any material now on the market.

Malathion is used on animals, vegetables, on fruits and forage crops, and in the home for household pests. It belongs in the group commonly known as the phosphates, but it is much safer to use than are the majority of the phosphates.

The following two materials are very interesting in that they represent new groups of materials not related to either the phosphates or the chlorinated hydrocarbons which have played such an important role in the chemical control of insects the past few years.

Sevin (Carbide and Carbon Chemical Co.). This material is a carbamate, and is related to some of the fungicides. It has fairly general usage and is one of the safer materials from the standpoint of mammalian toxicity. This material is especially interesting because it introduces a new group of chemicals as insecticides. This may be especially important, as insects develop resistance to the phosphates or the chlorinated hydrocarbons.

Thiodan (Niagara Chemical Co.). This is a heterocyclic sulfur compound which is quite poisonous to warmblooded animals. It has shown promise against tobacco aphids and boll weevils. It is of interest in that it introduces a new type of compound as an insecticide.

Non-Chemicals for Insect Control

Hazards connected with the use of chemicals for the control of insects, plus the residues which may be left on the products, plus the development of resistance to some of the insecticides have made us look for non-chemical means of controlling our insect pests.

The use of biological agents is offering some promise. Dr. Rabb has been using *Bacillus thuringiensis* for control and has obtained results equal to those obtained with chemicals. One of the important factors in the use of a disease organism would be the elimination of a residue problem. The bacteria which attack insects are not pathogenic to man or other warmblooded animals.

Another approach is the breeding of plants which are resistant to insect attack. Dr. Brett and Mr. Campbell have shown that there is considerable variation in susceptibility of varieties of beans to the Mexican Bean Beetle. Thus by using one of the less susceptible varieties, it would be much easier to control the Mexican Bean Beetle.

The following are the changes in the control recommendations for our major crops for 1958:

Cotton. For the boll weevil we have added calcium arsenate, Guthion, Malathion and methyl parathion. For spider mites we have added Nialate and Trithion.

Tobacco. For cutworms we have dropped sodium fluosilicate bait, and have added endrin dust or baits containing either aldrin, chlordane, dieldrin, or heptachlor.

For the control of flea beetles, we have added dieldrin.

Corn. We have added European corn borer as one of the pests and DDT for its control. We have also added the rough-headed cornstalk borer, with aldrin, dieldrin or heptachlor for control. We have also added webworms, with toxaphene for their control.

Peanuts. For the control of southern corn rootworm we have reduced toxaphene from 20 lbs./acre to 15 lbs./acre. As new pests we have added spider mite with sulfur as a control.

Forage Crops. We have added the spotted alfalfa aphid as a pest, with malathion as the material to be used for control.

Under grubs we have added dieldrin and heptachlor as materials which can be used for control.

Vegetables. We have added bean leaf beetle, with rotenone as the material for its control. Caterpillars on lettuce, we have added toxaphene for control. Corn earworm on beans, we have added methoxychlor. Harlequin cabbage bugs, we have added malathion. Hornworms on tomatoes, we have added toxaphene. Spider mites on beans, we have added aramite.

We have three relatively new insects in the state. The alfalfa weevil has spread quite rapidly the past year and now is present throughout the state where alfalfa is grown. It is primarily a pest in the Piedmont area.

Two years ago the spotted alfalfa aphid spread over most of the alfalfa-producing areas and was quite injurious in certain areas. This past year it did not cause much damage. We do not know what to expect in the future.

Fire ants have been found in Brunswick County and near Charlotte. The regulatory officials have been treating for the control of this pest and are in hopes that they will be able to eradicate the pest from North Carolina before it spreads.

The cotton boll weevil has shown considerable variation in susceptibility to the chlorinated hydrocarbons in North Carolina, as well as in other areas of the United States. However tests show that through proper usage of the chemicals it is still possible to produce a good crop of cotton.

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Squeeze Dusters and Aerosol Packages Feature of New Products at Garden Show

THE 18th National Garden Supply Show was held in New York City, February 1-14, at the Coliseum. A new feature of the show this year was a Dealer Workshop supplementing the Short Course Lectures. Garden supply dealers in attendance were given a series of talks on store design and location, point of purchase advertising aids and sales training designed to help them sell the modern amateur gardener more successfully.

Many of the displays were essentially duplicates of those shown last November 10-12 at the show held in Chicago on the Navy Pier. New aerosols for garden use were much in evidence, squeeze dusters were prominent in most lines and there was considerable new equipment for facilitating application of all types of products.

National Carbon Co., Div. of Union Carbide Corp., New York, showed its complete new line of garden products, which includes two aerosols and five squeeze dusters. "Eveready" rose spray (aerosol) is a 12-oz. package designed to function as an all-purpose pesticide, miticide and fungicide. Pyrethrins and rotenone provide the pesticidal action, Karathane is the miticide and Captan the disease controlling ingredient. An aerosol insect killer for home and garden (12 oz.) incorporates pyrethrins, methoxychlor and rotenone. The squeeze duster packages are 8 ozs. in size, and five formulations are offered for specific use on roses, flowers, vegetables, tomatoes and against ants. The rose dust employs malathion, Captan, Karathane and sulfur. In the floral dust DDT is added and Karathane omitted from the formulation. The vegetable dust contains pyrethrins, rotenone, Zineb and sulfur. To this combination Captan is added in the tomato dust. The ant killer is a straight 6% chlordane product.

Featured in the du Pont exhibit were two new liquid insecticide formulations, a new aerosol dressing for tree wounds and a new aerosol insect repellent. The new du Pont garden insecticide is a methoxychlor-malathion combination, designed to supply both quick knock down and residual action. The other new pesticide is a 72% chlordane product, designed for use on shrubs, lawns, ornamentals, against termites, and for outdoor application to protect against insects invading the home.

American Chemical Paint Co., Ambler, Pa., showed as a brand new product a chickweed killer, containing 13.3% 2,4,5-T. The particular advantage of this material is that it can be used at any time of the year that chickweed is growing. It is said to be particularly effective from October to May when chickweed grows most actively. It does not kill grass.

In its exhibit booth, Geigy Chemical Co., New York, called attention of the pest control operator to use of "Diazinon" in control of roaches, ants, fleas and other insect pests in homes, restaurants, hotels, etc. For the agricultural chemical market, and the home garden, Geigy featured its iron chelate, "Sequestrene," and its pre-emergence residual herbicide, "Simazin."

Another basic chemical manufacturer at the New York Garden Show, was Velsicol Chemical Corp., Chicago, who emphasized the use of "Chlordane for ants . . . household insects . . . garden pests . . . lawn insects, etc." A series of booklets for the home gardener described the habits of pests in the home, garden, lawns, trees, etc, and recommended control measures—using chlordane, of course.

A dust and spray guide prepared by Niagara Chemical Division, Middleport, N. Y., describes the home garden line of this company including insecticides, fungicides, herbicides and baits. Niagara called attention to its new granular herbicide "Swep" for use on roses, ornamentals, trees and certain vegetables.

Mixed fertilizers, growth hormones, and plant foods made up a substantial part of the New York show. Nitrogen Division, representatives pointed to the advantages of N-dure in mixed fertilizer, in stating that when a fertilizer manufacturer uses N-dure solution and urea in making a mixed fertilizer, "he makes urea-form in the very process of mixing."

The American Agricultural Chemical Co., New York, exhibited its full line of specific fertilizers: the "Agrico" series for turf, gardens, roses, azaleas, lawns, etc, and the organic fertilizer "Agrinite." Swift & Co. exhibited its Vigoro line of plant foods, and Borden Co., New York, featured "Borden 8," a slow-acting nitrogen fertilizer.

Miller Chemical & Fertilizer Corp., Baltimore, featured a number of aerosol products, which it has sold for several seasons. Several of their formulations for pest control are offered either as dusts, sprays or aerosols. Their fertilizers are generally packed in bags or cartons.

Gibberellic acid formulations were offered in almost every complete garden line, including Science Products Co., Chicago; and Miller Chemical and Fertilizer Corp., Baltimore.

Faesy & Besthoff, Inc., New York, displayed F&B Nutritional Iron, an aid to restoring chlorosis-suffering vegetation into healthy green plants. F&B Nutritional Iron approximates iron malonate, is water insoluble, neutral, and chemically stable.

In addition to chemicals and fertilizers, seed and pesticides, the Garden Show exhibits featured applicating equipment, hand sprayers and dusters. O. E. Linck Co., Clinton, N. J., offered a small liquid spreader for the lawn.

Lawn-Gro, Inc., Winona Lake, Ind., featured similar units plus several slightly larger with automatic pumps.

Other firms represented at the 10th National Show included: Armour Fertilizer Works, Carteret, N. J.; Boyle-Midway, Inc., New York; California Spray Chemical Corp., Richmond, Calif.; H. D. Hudson Manufacturing Co., Chicago; and Lebanon Chemical Corp.; Lebanon, Pa.

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Analysis of NPFI Survey Highlights Meeting of Fertilizer Industry Men

by H. H. Slawson

EDUCATION appears to be the key which will open the door to increased use of fertilizer by farmers in the midwestern corn belt.

This is the foremost conclusion drawn from an analysis of a survey of farmer attitudes toward use of fertilizer sponsored by the National Plant Food Institute. The report covering the corn belt survey was made public at the annual conference between fertilizer industry representatives and state college agronomists, held in Chicago, Feb. 13-14.

Also presented at the meeting was a parallel study of dealer attitudes toward fertilizer, made by two Iowa state college rural sociologists, which likewise stresses the need for an educational program and aggressive promotional assistance to retailers who seek to increase use of fertilizer by farmers.

The 2-day conference at Edgewater Beach Hotel was attended by some 700 persons, including research and extension specialists from 13 midwestern land grant colleges, fertilizer industry personnel, farm implement manufacturers and others from allied industries.

During the conference a positive program for aiding dealers was presented by N. P. F. I's midwest division. Also on the program was a paper explaining a new concept of the role of economics in making fertilizer recommendations, along with papers on new application methods and scientific reports on fertility research in Kansas and Ohio.

Easily the feature of greatest interest at the Chicago conference was the N.P.F.I. report on its survey of what midwest farmers think of fertilizer. The complete survey made by National Analysts, of Philadelphia, fills a volume of several hundred pages devoted to tables of data and a 150-page summary. This has been broken down to show results for each of four regions—south, northeast, corn belt and far west and for the nation as a whole.

Dr. M. S. Williams, chief economist for the Institute, assisted Z. H. Beers, NPFI midwest regional director, in preparing the summary relating to the corn belt. A representative sampling, Mr. Beers explained, was made nationally and regionally of farmers operating more than 100 acres. This sampling represented about 92 per cent of total U. S. farm land and, he added, "probably accounts for an even greater percentage of the potential market for fertilizer."

Farmers who use fertilizer at rates close to college recommendations were classified as "high" users. Those using a fairly good level, but well below college recommendations were rated as "medium" users. 'Low" farmers were those who use some fertilizer but in inadequate amounts; and a fourth class was the "none" farmers group.

One finding was that farmers give the use of fertilizer a number 2 rating in a list of selected practices that are "the mark of a good farmer'.' . . . The significance of this, Mr. Beers pointed out, "is that farmers, and especially fertilizer users, appear to have a positive, favorable attitude toward use of commercial fertilizer. Their high rates of fertilizer use indicates an exceedingly favorable climate for advertising and promotion of fertilizer."

The high level users were shown by the survey to be younger than non-users. They have more income; a higher capital investment, make more money per acre and have a better education.

As to the farmer's attitude toward fertilizer, the report says: "He seems to relate fertilizer use to greater production rather than lower cost per unit. He tends to think of an investment in commercial fertilizer as a financial risk with uncertain benefits. . . . He thinks the big advantages are that it is easier and quicker to apply, and soil needs can be supplied more accurately. . . . He thinks the big advantage of animal nature is that it conditions the soil. . . . He says he would use only slightly more fertilizer than he is now using, if he had plenty of cash and wanted to get the best investment for his time and money.' "

Another important finding was that the average farmer's knowledge about fertilizer is limited. Because of this and of the lack of understanding, it is pointed out, many communications about analysis and amount . . . "are not fully effective in influencing farmers' thoughts and behavior."

To overcome his uncertainties and lack of knowledge the farmer seeks information and advice from others. County agents and college publications rate very high with him as sources of practical information. Neighbors and family members however rank even above that group.

"It is significant," says the report, "that the farmer relies very heavily on his neighbors for information on whether or not it is a good thing to use fertilizer. . . When he has technical questions on what analysis and amount to use he tends to turn to the professional agricultural expert. . . . Local dealers are important when he is primarily interested in price."

Principal reading sources the farmer relies on are farm magazines and government and agricultural extension publications, in that order. "Literature published by fertilizer manufacturers rates very low," says the report. "Newspapers rate surprisingly low." . . . .

"Mass media may be the only means of communication with many farmers who do not come in contact

(*Continued on Page* 113)

A • *Russian knapweed* B • *Austrian field cress* C • *Bermuda grass* D • *Bindweed* E • *Hoary cress* F • *Canadian thistle* G • *Leafy spurge* H • *Quack grass* I • *Johnson grass*

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Fertilizer Views and News

Dr. Vincent Sauchelli

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

SEVERAL readers have requested more information about *ions*, the *cations* and *anions* mentioned in a previous discussion of "ionic balance" in the soil.

What is an ion? Mineral nutrients in the soil are present as ions which are atoms or groups of atoms or chemical elements carrying an electric charge. The charge may be positive (+) or negative (—). Most persons are familiar with the positive and negative convention used in discussions of electricity, as for example the poles of a battery. Those ions carrying a positive charge (+) are called cations and are written with the plus sign as a superscript, one sign for each charge; for example, sodium, its chemical symbol is Na and the cation designation is $Na+$. If the element carries two positive charges, two plus signs are used; for example, calcium, is designated by its cationic symbol $Ca+\,+$. Elements carrying negative electric charges (—) are called *anions, and anions* show the negative sign (—) as a superscript; for example, chlorine, $C1—$. Just as in the case of cations, for each negative charge, there will be shown a corresponding negative sign. For example, the anion (PO_4) has three charges and is written $(PO_4)———$.

Roots have the ability to absorb nutrients selectively from the soil. How to explain this function of taking up some elements and excluding others in the same solution has always baffled plant physiologists. Until quite recently it has been, like photosynthesis, one of nature's best kept secrets. But persistent study is bringing some rewards. By means of radioactive ions, E. Epstein of the U. S. Department of Agriculture has reported on results of his investigation which help our understanding of how plants get their nutrients. Epstein believes that we are to regard the root cell membrane as a sort of transportation medium. The membrane is not, as formerly believed, a sieve-like membrane through whose pores the nutrient elements propel themselves into the cell tissue. Not so simple. The cell has the power to utilize some of its vital energy to manufacture and energize specific chemical compounds in its membrane which act as self-powered ferries to give the selected nutrient elements a free ride across the membrane. The compounds seem able to pick up free ions, and to carry them across the membrane and into the cell proper.

These "ferry-compounds" will not pick up any and all elements It seems they are very "choosey" and each compound seems partial to a certain class of mineral ions. All the ions of one class—for example, cesium, potassium, rubidium—seem to compete among themselves for the limited space on the ferry; but one class or group does not compete with the other classes or groups of ions.

A review of ionic action, definition of "ions", "cation", "anion", and a discussion of how these make up the "ionic balance" in soils.

This in a way explains why sodium very often is able to replace potassium. They are not in the same class or group and therefore do not compete for that ferry ride.

All is not harmony in the soil solution. Nutrient elements show antagonisms as well as affinities. For example, calcum (Ca) and potassium (K) are antagonistic, and it is important to maintain a specific ratio of K to Ca in the cellsap for normal functioning. And so there is an optimal Ca to H ratio (H=hydrogen) for each pH situation in the soil depending on soil type. In sandy soils, the favorable ratio occurs at pH of 5 to 5.5; in loam soils, at a pH of about 6.0; clay soils, pH 6.5.

Calcium (Ca) and magnesium (Mg) elements are also antagonistic. Soil fertility is definitely influenced by the ratios of these antagonistic ions. The optimal Ca/H ratio for each soil type for example influences the absorption capacity of plants for many trace elements; assures the improvement of the physical, chemical and biological properties of the soil, which in turn influences the decomposition of organic matter and formation of humus, the nitrification of ammonia, conserves clay and favors the building up of a desirable crumb structure of the soil.

Thus, it is evident the interrelationships are many and complex. A balanced ionic state of the soil is one of the most important requirements for the optimal growth and development of the crop plants.★★

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LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Cyprex for the Control of Cherry Leaf Spot in Michigan

RESULTS of 2 years' tests comparing the effectiveness of a new fungicidal material, n-dodecylguanidine acetate (Cyprex), with other compounds for the control of cherry leaf spot (caused by the fungus *Coccomyces hiemalis*) in Michigan are reported by Donald Cation[1]. Only a combination of Glyodin and ferbam equalled it in 1956, and in 1957 it was superior to all other materials and combinations in the tests. Fruit from trees sprayed with it seemed normal in both years.

METHODS: Single tree plots replicated five times were used in both years. Three preharvest sprays, the first at petal-fall and two more at about 10-day intervals, and a fourth spray soon after harvest, were applied. In accordance with usual practice in the State, the preharvest sprays contained 2 pounds of lead arsenate per 100 gallons as insecticide. The trees were observed throughout the year but effectiveness of materials was judged on the basis of extent of defoliation in the fall.

RESULTS:

1956—Table 1 gives the results obtained in 1956, when incidence of leaf spot was about as usual. Unsprayed trees suffered complete defoliation. Cyprex and the combination of Glyodin and ferbam were equal in effectiveness and much superior to the other treatments. The copper-lime combination controlled leaf spot but was toxic.

1957—The 1957 season was unusually favorable to the disease and the experimental materials, therefore, were subjected to an exceptionally thorough evolution. Bloom was prolonged and light infection was prevalent before the first spray. The last preharvest spray was applied June 18. Rainfall totalling 8.14 inches on 14 days during the month from June 22 to July 22 washed off spray protection and produced ideal conditions for infection and spread before the after-harvest spray was applied on August 18.

Results obtained under these severe test conditions are shown in Table 2. Trees sprayed with ferbam, captan, and Omadine-zinc salt were so heavily infected at harvest time that the comparative tests were discontinued and the trees were sprayed with Acti-dione at 2 parts per million. The other treatments controlled the disease, with varying degrees of effectiveness. Cyprex was outstanding in leaf spot control and also corrected injury from lead arsenate. Trees sprayed with the other materials looked better at the end of the test than the figures in Table 2 suggest, but the terminal defoliation count shows the relative standing of the different treatments. The Glyodin-ferbam treatment was particularly good. Comparison with the Glyodin-ferric sulfate combination indicates that the ferbam in the former mixture contributed to control, in addition to preventing lead arsenate injury. The ferbam-Acti-dione combination gave good control but was injurious to young foliage. The materials containing copper were also effective but were more injurious than usual.

All trees in these standard spray comparison trials were bare on November 3, except those sprayed with Cyprex, which were conspicuous with one-third of the leaves still remaining, although losing color and gradually dropping off. Further study is needed to determine whether leaf retention is due to disease control or to some physiological action of the chemical.

Besides the standard comparison tests, some other observations were made in 1957. Considerable inoculum was present in one insufficiently sprayed orchard adjacent to the tests, and it was expected that further spread would result from the July 22 wet period. To determine whether the materials might exert an eradicative as well as protective action, sprays were applied on July 24, 2 days after the infection period. Cyprex was used in two strengths, at 1 and 1½ pounds per 100 gallons. A hyamine wetting agent, B1956, was added to Acti-dione used at 2 parts per million. At first Cyprex appeared to be a failure from the standpoint of this experiment, since yellowed leaves appearing on August 4 indicated that it possessed no eradicative capacity. After these leaves had fallen, however, foliage retention on the Cyprex-sprayed trees was satisfactory for the rest of the season. On the other hand,

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[1] Donald Cation, "Two years' results of testing Cyprex for control of cherry leaf spot in Michigan," *Plant Disease Reporter*, Vol. 41, No. 12, pages 1029-1031, Dec. 15, 1957.

Acti-dione prevented further spread from the July 22 infection, but during the fall rains trees became reinfected and were defoliated by October 4. The effectiveness of Acti-dione may have been diminished by the wetting agent since in other cases observed Acti-dione applied alone resulted in better control.

In a 30-year-old orchard a large-scale 6X concentration test was conducted. Cyprex at 6 pounds per 100 gallons was compared with Glyodin 9 pints plus ferbam 3 pounds per 100 gallons as the standard. Four sprays were applied with a mist blower, at the rate of ¾ gallon per tree. Commercial control was achieved with both treatments. No leaf spot appeared on the Cyprex-sprayed trees. A trace was present at harvest time and at the end of the season on trees sprayed with Glyodin-ferbam mixture. Both treatments gave good practical results.

All of the foregoing experiments were with sour cherry. One limited test, in which leaf spot was not a factor, was made with Bing sweet cherry in 1957. Cyprex was compared with the Glyodin-ferbam combination, lead arsenate being added to each, as before. Injury evidenced by leaf coloring and leaf drop resulted from the Glyodin-ferbam treatment but not from the Cyprex treatment, which suggests that the material may be useful for spraying sweet cherry trees.

Table 1. Defoliation per 100 spars following four spray treatments on Montmorency cherry at Shelby, Michigan, October 14, 1956.

Materials and amounts per 100 gallons	Average of leaves absent from spurs (number)
Cyprex[a] 1 pound	3
Cyprex[a] 1½ pounds	4
Glyodin 1½ pints—ferbam ½ pound	4
Tenn. 26 copper 3 pounds—lime 3 pounds	31[c]
Captan 2 pounds	59
Ferbam 1½ pounds	112
Omadine-Manganese Salt[b] 2 pounds	122
Omadine-Manganese Salt[b] 1 pound	274
Omadine-Manganese Salt[b] ½	279

[a] Supplied by the American Cyanamid Company.
[b] Supplied by the Olin-Mathieson Company.
[c] Defoliation on this plot resulted from injury.

Table 2. Defoliation from terminals of Montmorency cherry at Shelby, Michigan, October 4, 1957, as influenced by spray treatments.

Materials per 100 gallons of spray[a]	Leaves present (number)	Leaves absent	
		Number	Percent
Cyprex 1 pound	1856	64	3.3
Cyprex ½ pound	1501	86	5.4
Glyodin 1½pints, plus Ferbam ½ pound	1206	800	40.0
Omadine-copper salt 1½ lbs.	608	756	55.5
Ferbam 1½ pounds, plus Actidione 1 ppm	688	902	57.0
Glyodin 1½ pints, plus ferric sulfate ½ pound	708	1244	64.0
25% copper, 3 pounds, plus lime 3 pounds	390	800	67.0
Control (not sprayed)	....	....	....

[a] Lead arsenate at 2 pounds in 100 was included in each treatment as the standard insecticide.

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

Grasshopper Threat in 1958 on Large Acreage Western Rangeland

COOPERATIVE surveys were conducted in late summer and early fall of 1957 by State and Federal workers to determine the number of adult grasshoppers present, particularly in the central and western parts of the United States. These surveys found populations on more than 18,000,000 acres of rangeland heavy enough to produce, if all factors are favorable, grasshoppers in economic numbers during the spring of 1958. The actual population to appear in 1958 will depend upon many factors, among which are the number of eggs laid by the populations found, the parasite and predator populations, and weather conditions during and following hatching. Surveys to be conducted this spring when the insect is in the nymphal stage will give a very good idea of the problem that may develop.

Surveys showed 6 million acres of rangeland in the Texas Panhandle which could have an economic population this spring. Montana is second high with about 5 million acres, and California next with more than 3 million acres of rangeland. Eastern Colorado records 1.5 million acres and potential trouble spots are to be found in Washington, Oregon, Idaho, Wyoming, Utah, Nevada, New Mexico, Nebraska and South Dakota.

Cropland infestation potentials were found, in general, to be lighter than for the spring of 1957. Largest cropland threatening areas appear in Minnesota, Wisconsin, Kansas, Nebraska, North Dakota, South Dakota and Montana.

Boll Weevil Threat — Georgia, Ark.

COUNTS of cotton boll weevil in woods surface trash collected in four areas of Georgia during the fall of 1957 averaged 2,081 live weevils per acre of trash. The average for the fall of 1956 was 1,936 with the average for the past seven years being 1,300 live weevils per acre of woods trash. Area averages for 1957 and

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1956 for the four Georgia areas are as follows: northwest (Gordon County) 1,113 and 2,904; north central (Spalding and Pike Counties) 5,034 and 2,299; east central (Burke County) 1,791 and 774; and south (Tift County) 387 and 1,355 live boll weevils per acre of trash. Live weevils were found on 70 per cent of the farms examined with the maximum number per acre found on a single farm being 13,552 in Spalding County.

In the Hope area of southwestern Arkansas, counts averaged 3,472 live weevils per acre of woods trash compared with 1,398 in the fall of 1956. The McGehee area in the southeastern part of the State averaged 1,786 live weevils per acre of trash. This is a new area for hibernation study; consequently, no comparison can be made with previous years.

High Losses to Corn Borer

FIGURES recently released show that the European corn borer caused loss of approximately twice as many bushels of corn grown for grains in 21 states in 1957 as in 1956. The 1957 loss was estimated at over 180 million bushels valued at $158 million based on December price level. This was estimated to be approximately 6 per cent of the total national crop. The 1956 loss was over 97 million bushels with the highest loss since 1950 being in 1954 when over 191 million bushels were lost to the borer.

The state showing the heaviest loss to the European corn borer was Iowa with a 102,166,000 bushel loss. The next state was Nebraska with over 18,816,000 bushels lost, followed by Missouri, 16,399,000; South Dakota, 16,351,000 and Illinois, 10,976,000. Each of the other reporting states had losses ranging from slightly less than 10 million bushels to only a trace loss for Vermont.

General Insect Activity Light

COLD weather throughout most of the United States during January and early February helped keep insect activity at a low level. Counts of greenbug on small grain in Oklahoma have been very light. The highest counts were scattered infestations of 50-500 per linear foot in wheat and barley in the Hennessey area of Kingfisher County. Occasional specimens were found in Major County, less than one per linear foot of wheat row in Logan County. Light infestations have also been reported from Curry and Quay Counties, New Mexico. In Kansas a survey in four counties failed to show any greenbugs.

The spotted alfalfa aphid also continues to be very light. A survey in four Kansas counties was negative and light in southern New Mexico. Low numbers continue throughout Oklahoma. In Tillman County a slight increase was noted late in January with counts of 0-30 per plant. Light infestations were reported in Rockwall County, Texas in early February.

The vegetable weevil was heavy in dichondra lawn roots at Riverside, California. This insect was also building up on weeds in East Baton Rouge Parish, Louisiana and attacking mustard and turnips in Jones County, Mississippi. Several species of aphids were appearing on celery and cole crop in Los Angeles County, California, during the first part of February. Such early occurrence is unusual for the area.

Cattle grub surveys during late January showed the following counts: Montgomery County, Virginia and Prince Georges County, Maryland, 8 per head; Woodward County, Oklahoma, 5 to 10 per head; Chase County, Kansas, 6 per head; Arkansas (statewide) 2 per head which was slightly lower than at the same time the previous year.★★

Med Fly Control Comments

Some rather erroneous interpretations of statements made by Paul F. Springer, U. S. Fish and Wildlife Service, laurel, Maryland were reported in the December 1957, issue of AGRICULTURAL CHEMICALS, pages 86A and 106. We sincerely regret the errors, and hope the following corrections will clarify any questions arising.

Mr. Springer discussed the effects of field applications of pest control chemicals on fish and wildlife at the November 26th session of the Eastern Branch meeting of the ESA. He stated that malathion treatments were made in southern Florida for Mediterranean fruit fly control (our report indicated Southern California). Also contrary to the article in the December issue, Mr. Springer advised that "malathion can have a harmful effect on fish. In certain areas, large numbers (in some cases the majority) of killifishes and certain other species were killed or affected. Mortality extended for several days and appeared to be greatest in still, shallow water. Instances of mortality to tropical fish also were reported.

"With regard to Heptachlor," Mr. Springer said, "it has had no *reported* effect on warm-blooded animals"; not that it has no effect. To elaborate, Mr. Springer calls to our attention that in the reports he had received of heptachlor treatments in the field up to that time, he and his associates had not heard of damage to warm-blooded animals. He advises, however that he has since learned that there was some loss of birds from a reported 2-pound per acre application of heptachlor for control of the imported fire ant in Arkansas during the spring of 1957.

NAC Pest Control Facts

The National Agricultural Chemicals Association, Washington, D. C., has prepared a "fact book" on pest eradication for newspaper reporters and editors and radio news broadcasters. The book contains sections on forest pest control, pesticide chemicals, and pesticides and wildlife.

The Information, contained in 18 pages of excerpts from quotations by industry and government authorities on pest control, public health, and conservation, is intended to aid in the preparation of news stories, editorials, or newscasts on the subject. The preparation of the fact books was inspired by the increasing public interest in pest eradication, particularly in the gypsy moth and fire ant programs.

Joint Meeting At Detroit

The Entomological Society of Canada will meet with the Entomological Society of America at the Sheraton - Cadillac Hotel, Detroit, from Nov. 30 to Dec. 3, 1959.

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WASHINGTON REPORT

By Donald Lerch

THE economic war is getting hotter! Chemicals and agricultural commodities are in the middle of it and likely to stay there. Government policies on subsidies, tarriffs and acceptance of foreign currencies are clashing head on. Washington is deeply concerned about the outcome.

One of my friends told me about conceiving a piece of business in Japan three years ago and nursing it along with slow but continuous growth. This year, conditions were ripe for a mansized chunk of business to develop. The company was all set to sign the deal when - Wham - Germany stepped in and took the business away. The reason, price.

Another friend of mine just back from South America tells the story of a Polish sales mission in Colombia. The mission was empowered to sell machinery and accept coffee as barter in return. Imagine a Colombia manufacturer's eyes when he learns that he does not need to get an unavailable import license, nor does he need to find even Russian money to pay the bill - rather the Russians will accept coffee, which is in surplus in his country. Not only did this deal freeze out the U. S. competitors, but also won over both Japanese and German sales missions.

This same businessman tells me that when it comes to selling agricultural chemicals - the Germans have many of the same materials we have, and often times they will provide better credit terms. Matter of fact he tells me the German government underwrites most of the credit risks. The U. S. government does not, therefore on this single point alone the Germans have quite an advantage.

Brazil has a tremendous surplus of coffee, and one that is growing. She, along with other coffee producing nations, is attempting to hold coffee off the market in order to maintain the price. This means she, along with Colombia and the Central American countries is buying coffee from the growers and storing it much the same as the Commodity Credit Corporation in the U. S. buys the surplus of U. S. farmers. However it's questionable whether Brazil's finances or those of the other nations involved are strong enough to keep this up for long. Consequently, the pressure to sell coffee is tremendous:

Into this picture, according to latest on-the-scenes reports, I have, come the Russians. They're offering to exchange the coffee for television sets and many other highly prized consumer goods which are being produced in the Russian areas of Europe. Under the deal, it would be possible for a Brazilian to buy a television set at about one-fourth the current price. Tempting isn't it?

If we lower the boom and take the business away from Western Germany and Japan, they will be forced to trade more with Red China and Communist Russia. On the other hand, American manufacturers and farmers are entitled to their fair share of the market.

* * * * *

One facet of the agricultural program before Congress upon which there's general agreement is the extension of Public Law Law 480. Secretary Benson is asking for an additional one and one-half billion dollars for use in the new fiscal year to subsidize the exports of agricultural commodities and, where necessary, to accept foreign currencies in return. part of the program involves the use of some of the payment funds within the country of origin to develop larger markets for the surplus U. S. commodity. There are signs that great success stories are in the progress of being written in Germay and to some extent in Spain.

In Germany, a goose-eating country, U. S. salesmanship is teaching the Germans to ask for turkey. In Spain, U. S. soybean marketers are writing success stories by building consumption on an important feed grain. There are several success chapters involving the development of markets for dried milk products. It would not be surprising for this to be the first major piece of agricultural legislation passed and signed this year.

With both the fertilizer and pesticide industries greatly concerned with cotton, it's notable that under P.L. 480 cotton exports were increased sufficiently so that world acreage remained static. During the past several years, U. S. exports have declined and world acreage has increased proportionately. Under P.L. 480 it has been possible to reverse this trend.

If P.L. 480 is extended, it will assure substantial overseas markets for agricultural production and tend to give strength and tone to the markets. Keep an eye on this one.

* * * * *

Reports are just in on the tremendous growth in the use of chemicals for weed control. Experts now estimate that losses from weeds have reached an estimated 5 billion dollars. During last year, over 350,000 acres

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of cotton were sprayed for weed control. In addition, farmers sprayed 12 million acres of corn, representing about 20% of total acreage. What's more, 18 million acres of small grains were sprayed. Weed control in pastures and range lands increased so that over 2½ million acres were treated.

Further uses of herbicides are developing for the control of weeds on ditchbanks, roadsides, and along power and telephone lines. New research information often shows that chemicals cut the cost of highway maintenance and do a better job.

Herbicides are winning additional favor as a means for wiping out poisonous weeds and those that cause hay fever. In some cases, community-wide programs of this kind are turning amazing results at relatively low costs.

* * * * *

Washington is still a bit surprised over the action taken by the Food & Drug Administration in establishing a zero tolerance for methoxychlor. Feeling was that the Food & Drug Administration would have accepted a tolerance of 0.25 ppm in milk, assuming a recognized scientific group would endorse the position. Of course, this is speculation since the Food & Drug Administration could never make such statement nor take such position. But at least it is known that the Food & Drug Administration welcomed a full examination of the question.

Through the machinery of the Miller Amendment, the Food & Drug Administration had the National Academy of Sciences appoint a committee to examine the question, headed by Herbert E. Longnecker. Other members were Arthur C. Dahlberg, E. M. K. Geiling, Charles J. Kensler, and Charles M. Day.

A number of questions have been reaching Washington on the effect of the Food & Drug Administration on tolerances established for methoxychlor on raw agricultural commodities, including forage crops in which case a tolerance of 100 ppm has been allowed. The Committee feels its action is not inconsistent with the tolerance of 100 ppm, since research has shown that when forage carrying such residue is eaten, the pesticide is dissipated before reaching the milk stream.

Nonetheless, Washington was caught a little off base.

* * * * *

It might pay this year as never before to have field technicians and salesmen keep up to the minute on farmers' planting intentions. With all the furor in Washington over price supports and acreage restrictions, plus various commodity programs for the control of supply and price of farm items, don't be surprised to see continuing shifts in acreage planted.

For instance, farmers have reportedly signed agreements with the government offering four million six hundred thousand acres of corn, cotton, rice and tobacco allotment land for the soil bank. Breakdown as follows:

Cotton	3,266,000	Acres
Corn	1,238,000	Acres
Rice	72,000	Acres
Flue cured & Maryland Type Tobaccoes	39,000	Acres

Three hundred sixty thousand individual farm agreements are involved. It pays to keep posted!★★

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N. C. Seedsmen Open House

The North Carolina State College school of agricultural and college extension division held an open house for North Carolina seedsmen at Raleigh, Feb. 11.

Among the topics discussed at the open house were: What's New in Insecticides, by Dr. C. L. Smith, head of the entomology faculty; and What's New in Fungicides, by Dr. D. E. Ellis, head of the plant pathology faculty. John Harris, horticultural extension, told how research helps answer questions and Francis Poole, representing the North Carolina Seedsmen's Association, spoke on Projecting Research to the Customer. Dr. P. H. Harvey, head of the field crops department, told of new field crop varieties and weed control.

Cites Herbicide Progress

The past ten years have been characterized by growth in the acceptance and usage of herbicides, in the development of many new chemical weed killers capable of solving a broad spectrum of vegetation problems, in the development of new application concepts and techniques, and growth in industrial research and development organizations, according to Chester E. Otis, Dow Chemical Co., Midland, Mich.

Speaking before the 10th annual California Weed Conference, San Jose, Jan. 22, Mr. Otis said that the Bureau of Census estimate for the value of weed killer shipments in 1955 was almost 41 million dollars as compared with a value of shipments in 1947 of only eight million dollars. He cited figures which show that of the 260 million dollars spent for pesticides in 1956, 35 million went for herbicides. This puts herbicides in third place behind insecticides and fungicides and ahead of miticides, soil fumigants, rodenticides, repellents, and others.

Mr. Otis summed up some of the most important industry problems at the present time as profitability, education, and fundamental research. He said that these problems are capable of solution but their importance must be more widely appreciated.

Speaking of the Miller Amendment, Mr. Otis said that its effects have increased the interdependence of industry and those public institutions engaged in research and education.

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Rommel Allwine & Rommel

E. Ernest Allwine and Royal R. Rommel, former members of the firm of Lancaster, Allwine & Rommel, patent attorneys, have entered into a new partnership with John M. Rommel under the firm name of Rommel, Allwine & Rommel.

Lancaster, Allwine & Rommel was dissolved as a result of the retirement of C. Everett Lancaster. The new firm, specializing in patent, trademark, copyright, and unfair competition causes, is located at offices of the old firm in Washington, D. C.

TECHNICAL SECTION

Soil Specialists Discuss A Leaf Analysis Service

SOIL science specialists at Michigan State University are sounding out the fertilizer industry on its attitude toward a proposal to establish a leaf analysis service at the East Lansing institution with men trained to handle it.

Speaking at a recent fertilizer conference conducted by the soil science department and the state extension service, Dr. R. E. Lucas pointed out that, because of limited interest, there is no service at present for complete leaf analysis on annual plants.

The university's main responsibility, he said, is education and research and, since soil testing is a service responsibility, the soil testing program has been placed out in the counties. These county laboratories are in charge of the county agricultural extension agent, and a fee is usually charged to cover expenses. Commercial testing service is, however, encouraged.

"If a leaf analysis program is initiated, could you find use for it?" Dr. Lucas asked representatives of the fertilizer industry in his audience. "You, the members of the fertilizer industry can determine the direction such a program should take."

The service under consideration, he explained, is intended to make recommendations from the use of the flame photometer and the emission spectrograph. Rapid tissue tests with these instruments have a definite place in diagnostic work, he declared, adding that, in his opinion, no one should use the spectrographic method until he has first used the rapid tissue method.

A complete leaf analysis service is not a new project, Dr. Lucas continued, as university staff members have been performing this service on a limited basis for fruit growers since 1953.

In 1956, he stated, 1240 samples were analyzed and in 1957 the number was about 2500. Only about 10 percent, however, was for actual growers, he said, the other samples being handled in conjunction with research work.

The use of leaf analysis, Dr. Lucas said, can be helpful in such studies as: (1) determining efficiency of fertilizer use; (2) crop removal of nutrients; (3) limiting elements in crop production; (4) toxic concentrations or luxury consumption; (5) nutrient supplying power of the soil; (6) pedicting fertilizer requirements; (7) mineral value of feeds and food.

"It requires skilled technicians and chemists to be able to operate leaf analysis instruments," said Dr. Lucas. "The instruments are also expensive. A flame photometer will probably cost $2,000. A modern spectrograph will cost $30,000. In addition, there are costs of Kjeldahl apparatus, muffle furnace, office equipment, etc.

"What commercial company would be willing to venture into a leaf testing service when such costs are involved? Should the university assume this responsibility during the initial phase of development, We need additional information to determine threshold values or deficiency and toxic amounts. Should a special laboratory be set up for use both on research and in service work? The final answer will have to come from the interested groups and departments and the university authorities."

Study Resistance in Lice

USDA entomologists are investigating the possibility that certain strains of the long-nosed cattle louse may be developing resistance to some of the chlorinated hydrocarbon insecticides used to control these pests.

The investigations were triggered by the failure of two normal treatments of lindane, in an emulsion spray, to eradicate the lice from a shipment of beef calves purchased by the USDA for other experimental purposes. Survival of some lice, following the two treatments, led to the discovery that the original owner also had administered two spray-dip treatments of lindane in far heavier dosages.

Darrel W. Anthony, entomologist at the agricultural research center at Beltsville, Md., has reported that sprays containing 0.075 per cent lindane and 0.5 per cent DDT failed to control the lice beyond seven to 14 days. Malathion, however, gave complete control of the insects for the entire 60 days of the trial when applied as a 0.5 per cent spray.

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Additional Glyodin Use

The U. S. Department of Agriculture has accepted a statement that "Glyodin can be used as a spreader-sticker" for addition to the fruit fungicide's commercial label, according to the Union Carbide Chemicals Co.

Union Carbide points out that the double benefit of both fungicidal and spreader-sticker actions will bring new operating economy to many apple, red cherry, and peach growers. The extra benefit already has caused Glyodin to be recommended in Virginia for addition to the zinc-lime spray that is used to control peach bacteriousis, and in Massachusetts for inclusion with dichlone and ferbam for peach canker control.

•

Residue Analysis in Milk

One part of foreign material in 100,000,000 parts of milk can be detected by a new research technique described at the American Chemical Society's second Delaware Valley Regional meeting held February 5th in Philadelphia.

This sensitive radioactive method has been developed to determine whether certain chemicals in insecticides, which have been sprayed directly on animals or used in their fodder, can work into the milk produced by the animals, according to Dr. Alan R. Weiss of the Rohm & Haas Co., Philadelphia. Dr. Vera R. Usdin and Francis L. Jackson, also of Rohm & Haas, were co-authors of the report.

In research described by Dr. Weiss, experimental insecticides containing built-in radioactive atoms of carbon and hydrogen were incorporated in fresh milk, which was then frozen and dried. The resulting milk solids were ground and suspended in a gel in preparation for measuring their radioactivity by means of a liquid scintillating device, said Dr. Weiss, who continued:

"The samples were counted, shaken and re-counted. It was apparent that the shaking had broken up the milk particles to a large extent, but no change in counting rate was observed. Residues of 0.01 parts per million of milk were detected with the use of insecticides with specific activity of 0.015."

The liquid scintillating device was selected for these studies because of its excellent counting efficiency and its ability to measure radioactive hydrogen, he said.

Dr. Usdin presented a second paper which described dye experiments on milk containing a class of pesticides based on ammonium compounds. The presence of foreign matter ranging in amounts from 0.5 to 200 parts per million of milk was determined by addition of Orange II, an organic dye, which causes the milk product to form an orange-yellow color. The depth of color, as measured by colorimetric or spectrophotometric analysis, is directly proportional to the amount of pesticide residue in the milk, Dr. Usdin said.

A mixture of ammonium compounds and fresh milk was chemically treated to yield a dry powder, which was placed in a tube and shaken thoroughly with the solvent tetrachlorethane. The tetrachlorethane was removed, and the remaining dry residue was re-extracted with a fresh solvent. This resulted in the formation of a slurry to which the dye was added. The mixture was again subjected to centrifuging and then exposed to color analysis.

"It is expected that, by the use of large samples, one part of insecticide residue in 10 million parts of milk may be detected," said Dr. Usdin, adding:

"The technique also is adaptable to the analysis of pesticide residues in other dried foods."

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New Apple Scab Fungicide

Plant Protection Ltd., a subsidiary of Imperial Chemical Industries, London, has developed PP Liquid Mercury Plus, which, it is stated, can be used either as a routine protective spray or as a curative or eradicant spray following a period of scab infection.

PP Liquid Mercury Plus is available in the form of a liquid, containing a mixture of organic mercury compounds combined with a special fungicidal compound. Better results controlling apple scab are claimed for the fungicide which has been subjected to lengthy trials in England.

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Proceedings Of 10th Congress

The proceedings of the 10th International Congress of Entomology, held in Montreal, Canada, in August 1956, are now in the course of publication and are expected to be ready for distribution in late 1958. The price is $75 for the set of four volumes.

The set may be ordered from the Tenth International Congress of Entomology, Science Service Building, Ottawa, Canada.

NEW BOOKS

Nuclear Radiation in Food and Agriculture, edited by W. Ralph Singleton. Published by D. Van Nostrand Co., Princeton, N. J. Price $8.50, 371 pages.

The final publication in the Geneva Series on the Peaceful Uses of Atomic Energy edited by Dr. J. G. Beckerley, this book brings together material on the methods, techniques, and effects of applying nuclear radiation in the fields of food and agriculture. The chapters in the book are based on papers selected from those presented at the Conference on Peaceful Uses of Atomic Energy held in Geneva, Switzerland, in August, 1955.

Included are papers on photosynthesis, one by workers in the U.S. and one from Russia; genetic and biological hazards of nuclear radiation; the eradication of the screwworm fly in the island of Curacao; crop improvement; food sterilization; and others. The book is carefully indexed and arranged to serve as a convenient reference on the latest information available today on the subject.

Mr. Singleton is director of the Blandy Experimental Farm, University of Virginia.

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Crop Production in the South, by Glenn C. Klingman. Published by John Wiley & Sons, New York. 416 pages, $4.95.

The second volume of a Southern Farm Series published by John Wiley, this book is intended for students of agriculture in the South. Botany, Plant Physiology, genetics, chemistry, and physics are presented in simple language. Individual chapters deal with scientific crops or topics.

Photographs, drawings, and cartoons are used in the book to illustrate important points. Chapers are included on The Soil and Plant Growth, Weed Control, Crop Improvement through Plant Breeding, and specific crops such as cotton, corn, potatoes, and tobacco.

Mr. Klingman is professor of field crops at North Carolina State

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College. The book was prepared with the editorial assistance of Lyman J. Noordhoff, information specialist, United States Department of Agriculture.

•

Sevin For Forest Insects

Recent tests conducted by Dr. L. A. Hetrick, College of Agriculture, University of Florida, indicate that Sevin experimental insecticide shows promise for the control of insects attacking freshly-cut pine wood. Dr. Hetrick's tests delayed attacks of bark beetles, ambrosia beetles, and sawyers about six weeks, according to the Union Carbide Chemical Co., division of the Union Carbide Corp., New York, manufacturer of Sevin.

The insecticide was applied by spraying freshly-cut slash pine logs to the point of run-off. Logs were left on the ground after treatment. Nine weeks after cutting, treated logs were in sufficiently good condition for milling, while untreated check logs were worthless. A formulation of Sevin 50 per cent wettable powder was used in the Florida tests.

Kansas Recommends Heptachlor On Forage Alfalfa

FARMERS in eastern Kansas can anticipate problems with chinch bugs and European corn borers during the coming growing season, while those on the west central border will have their troubles with a severe grasshopper infestation. This was the warning of David L. Matthew, state economic insect survey entomologist stationed at Kansas State College, Manhattan, in a talk prepared for the second annual Kansas insect and weed control conference, held February 4-5.

Cinch bugs will continue to be a serious problem in east central and southeast Kansas, in spite of improved moisture conditions. Heavy populations of chinch bugs went into hibernation in the fall, and the seriousness of next year's threat depends upon weather conditions.

European corn borer damage also will depend upon the overwintering populations, but prospects are for heavy to very heavy populations in the Kansas river valley and northeast Kansas. Losses easily could run higher than the $1,428,000 estimated loss in 1957, Mr. Matthew predicted.

For the state as a whole grasshopper infestations should be much lighter than a year ago. Heavy damage may be expected throughout the season along the central part of the western border, and there is a 20-county triangle cornered by Jewell, Marion, and Nemaha counties in which threatening populations occur.

Principal changes in Kansas State College insecticide recommendations this year are the elimination, or limiting, of some insecticides, Dell Gates, extension entomologist, told the insecticide sprayers and pesticide dealers attending the conference. This has generally meant a change to insecticides with shorter residual life.

A good example of this is for grasshopper control in forage alfalfa, he explained, with recommendations this year calling for heptachlor with a waiting period of seven days before harvest. Such materials as DDT and toxaphene give good control of grasshoppers, but are not recommended for forage alfalfa because of the residue problem they present, he said.

In a few instances, insecticides with longer residual effect have been approved by the labeling division in the past year. A recent one was approval of methoxychlor in the 50 per cent wettable powder formulation for use on dairy animals. Last year no long lasting insecticides were available.

Two new systematic materials are on the recommended list for the first time, thimet and trolene. Thimet, which may be used for seed or soil treatment in alfalfa at time of planting, is a new material which provides several weeks of seedling protection against aphids. Torlene (ET-57), which gave promising results last year in cattle grub control, has been approved for use with certain limitations. Recommendation is to give boluses anytime after the heel fly season and before grubs appear in backs of the cattle (June to October).

INDUSTRY PATENTS

2,755,176. Plant Food Manufacture. Patent issued July 17, 1956 to Thomas J. Pearce, Bartow, Fla., and Everett N. Mortenson, Chicago, assignors to Swift & Co., Chicago, a corporation of Illinois. In a continuous process for the manufacture of mixed fertilizers wherein inorganic salts are preformed and subsequently admixed with fertilizer material, the improvement which comprises: continuously passing streams of strong mineral acid and a basic substance into a reaction zone; contacting said mineral acid and said basic substance within said zone whereby to react said mineral acid with said basic substance in a smooth uninterrupted fashion whereby to form a gaseous product comprising steam and a hot non-gaseous product; passing said gaseous product into a second zone; separating the gaseous from the non-gaseous product therein: and immediately thereafter passing said non-gaseous product into a third zone containing fertilizer material and admixing said non-gaseous product with said fertilizer material while maintaining substantially the entirety of said gaseous product out of contact with said fertilizer material in said third zone.

24,184 (Reissue). Emulsifiers and Toxicants Containing the Same. Patent issued July 24, 1956 to Herbert L. Sanders, Edward A. Knaggs, and Marvin L. Nussbaum, Chicago, assignors to Ninol Development Co., Chicago, a corporation of Illinois. An agricultural and livestock composition for use in conjunction with organic solvent solutions of water-insoluble toxicants, which, upon the addition thereof to soft as well as hard waters, forms a fine dispersion therein of said toxicants, said composition containing (a) at least one member selected from the group consisting of higher molecular weight ethers and thioethers of [polyoxyalkylene] *polyoxyethylene* glycols and higher molecular weight carboxylic acid esters of *polyoxyethylene* [polyoxyalkylene] glycols, the higher molecular weight radicals containing from 8 to 22 carbon atoms and the *polyoxyethylene* [polyoxyalkylene] glycol radical having a molecular weight between about 200 and 6000, [the polyoxyalkylene glycol being selected from the group consisting of polyoxyethylene glycols and polyoxypropylene glycols,] and (b) an oil-soluble compound corresponding to the formula (diagram given) where Alk is an alkyl radical, n is an integer from 1 to 3 with the proviso that (Alk)n contains from 8 to 18 carbon atoms, R is a member selected from the group consisting of methyl [, phenyl, hydroxy-phenyl] and hydroxyl, and M is an alkaline earth metal selected from the group consisting of calcium and magnesium, said ingredient (a) and said ingredient (b) being present in proportions to each other ranging from about 9 to 1 to about 1 to 9.

Arcadian® News

Volume 3 For Manufacturers of Mixed Fertilizers Number 3

Tips to Help You Speed Production

Another late season is shaping up. This means that last-minute buying by farmers will require peak production to get the tonnage out. Manufacturers who are able to mix and ship at a rapid rate will make more sales.

There are many things you can do now to prepare to meet this situation. Arrange for your raw materials in advance so that you will have supplies on hand when needed. Organize traffic patterns for incoming and outgoing trucks, to speed handling. Set up a routine for checking equipment, to avoid breakdowns. Plan to use late-season, extra bin space for dumping in small piles for faster curing. Plan to keep bagged fertilizer stacked low to reduce bag set.

Selection and use of the proper ARCADIAN® Nitrogen Solutions can be a big help in speeding output. For example, these Solutions, direct from tank car or storage, can supply in one operation different forms of nitrogen often added as separate materials. This saves time, labor, traffic and expense.

Mixtures made with large amounts of solid nitrogen materials cure slowly. It pays to ammoniate with ARCADIAN Nitrogen Solutions at maximum rates to produce mixtures that cure more rapidly. The increased ammoniation rate pays off in extra volume of better quality goods.

ARCADIAN Nitrogen Solutions with a low water content help to produce mixtures that cure faster, especially when used with superphosphate of relatively high water content. For granular fertilizers, NITRANA® Solutions 2M, 3M, 3MC, 7 and some URANA® are ideal. For non-granular fertilizers, URANA® 10 or 13 are generally most suitable.

The ARCADIAN Manual on Nitrogen Fertilizer Solutions for Fertilizer Manufacturing contains useful information to help you produce quick-curing quality fertilizers. If you do not have a copy, obtain yours from Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N. Y.

Many fertilizer manufacturers have found that they can mix and ship at a rapid rate, by ammoniating with URANA Solutions. The improved crystal structure produced by URANA reduces hardness of set in the pile and secondary caking in the bag. You get faster cooling and curing in rehandling ammoniated fertilizers before storing.

Your Nitrogen Division technical service man is familiar with methods and materials that speed production of good-quality mixed fertilizers. Getting his advice and assistance now may help you to mix and ship more tonnage during your peak period. This service is available to customers without charge. Simply contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

Arcadian® News *for Fertilizer Manufacturers* . . . . *from* **NITROGEN DIVISION**

It Pays to Be Ahead of Your Competition

The more you put into mixed fertilizers to benefit the farmer, the more difficult you make it for home-mixers to match your product and your service. Producing better fertilizers is one of the best ways to stay ahead of your competition.

The term "complete fertilizer" once meant nitrogen, phosphorus and potash. Today "complete fertilizer" can mean nitrogen, phosphorus, potash, calcium, sulphur, and magnesium . . . plus "trace elements" such as boron, copper, iron, manganese, zinc, molybdenum and cobalt, as needed by the crop and the soil. Some complete, mixed fertilizers now also contain insecticides in addition to plant foods.

TONNAGE OPPORTUNITY

The fertilizer manufacturer who simply mixes sources of nitrogen, phosphorus and potash, without considering the complete needs of the crop and soil, is bound to face stiff competition.

Every farmer prefers to use fertilizer that contains everything his crop needs, over and above what his soil can supply, to produce profitable yields. He also prefers a homogeneous, chemically-blended fertilizer that is well-cured to stay in good condition in storage and flow freely through his distributor.

Proper selection and use of nitrogen in manufacturing mixed fertilizers can be a highly-important factor in winning the battle against competition. Most crops need more nitrogen than any other plant food. Most crops also need graduated feeding with nitrogen that becomes available according to the feeding schedule of the crop.

When fertilizer contains the correct forms and amounts of nitrogen in balance with other plant foods, the farmer can supply the complete needs of his crop with one trip across his field. This saves time and labor and makes fertilizer more economical and more attractive to the farmer.

The fertilizer manufacturer who supplies the complete nitrogen needs of a crop with mixed fertilizers reduces the need for straight nitrogen materials. This increases his mixed goods and plant food sales at a greater profit than he usually makes from selling straight nitrogen materials.

The newly-developed, modern ARCADIAN® Nitrogen Solutions make it easy and practical to ammoniate superphosphate to produce high-nitrogen, high-analysis, good-condition mixtures. By proper selection of Solutions, fertilizers can be made to contain various forms of nitrogen, such as nitrate, urea, and ammonium nitrogen.

Home-mixers and small blenders are not equipped to ammoniate superphosphate, a big advantage enjoyed by the fertilizer manufacturer. Ammoniated superphosphate not only puts nitrogen and phosphorus into the fertilizer, it also adds calcium and sulphur. And it provides an excellent base to which other ingredients can be added as needed by the crop and soil. And proper ammoniation enables the manufacturer to produce high-analysis, free-flowing fertilizers.

Feed manufacturers have been highly successful in holding and building their market by producing a complex product containing many ingredients needed by livestock. Fertilizer manufacturers can be equally successful by putting more in their product . . . more of the needs of crops and soils . . . more free-flowing, non-segregating, easy-handling quality . . . more economy and more efficiency. This is the way to stay ahead of your competitor who cannot match your superior product.

The Best Fertilizers are Mixed Fertilizers
Buy Yours NOW!
NITROGEN DIVISION, ALLIED CHEMICAL · SUPPLIERS OF NITROGEN TO THE FERTILIZER INDUSTRY

Shown above is another powerful billboard in the continuing Nitrogen Division advertising campaign to urge farmers to purchase their plant food in the form of mixed fertilizers. This billboard is now appearing in hundreds of locations in leading farming areas where it will be seen by millions of farmers. Nitrogen Division, Allied Chemical, produces and sells nitrogen. But Nitrogen Division has always aggressively supported the importance of using nitrogen in a balanced fertilizer program. We trust these efforts increase your sales. If you wish a full-color miniature reprint of the poster shown above, request this from Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N. Y.

Arcadian® News *for Fertilizer Manufacturers* . . . . *from* NITROGEN DIVISION

Fertilizer performance in the field is really what counts to the farmer. Properly-used fertilizer is worth two to five times its cost, in yields and profits.

But, if an unsuitable analysis is used or the fertilizer is improperly placed, fertilizer can be a costly production item. And a low rate of use is usually much less profitable to the farmer than adequate application.

Every fertilizer manufacturer, salesman and dealer owes it to his customers to know how to use fertilizer to make crops make the most money. Profits for the farmer and the fertilizer man depend on the proper use of fertilizer.

It takes time and effort to learn how to recommend a profitable fertilizer program to farmers. And time is money! But when you sell extra bushels and extra profits, instead of simply selling N, P and K, a farmer is willing to pay for YOUR product and YOUR service. He gets more results per dollar invested.

Many surveys show that the farmer depends more on the dealer than on anyone else for advice on fertilizers. Alert dealers are taking advantage of this fact to sell a program. Thus they get a better price for fertilizer and more repeat sales. Crop-producing power and profit-potential are more important to the farmer than price.

Don't make price the important sales point. Somebody else will always undercut you!

EXPANDING UREA PRODUCTION. To meet increasing agricultural and industrial demands for urea, Nitrogen Division, Allied Chemical, is now enlarging the productive capacity of its plant at South Point, Ohio. Urea is used in making ARCADIAN® URANA® Nitrogen Solution for manufacturing mixed fertilizers, URAN® Nitrogen Solution for direct application to the soil, UREA 45 pelleted nitrogen fertilizer, PROCADIAN® Urea Feed Mixture, and Crystal Urea for industrial use. In 1954, the South Point plant introduced a new process for urea synthesis developed by Allied Chemical research. This process is capable of producing urea of exceptional purity.

Where do farmers seek advice on fertilizers?

Which sources of information does the farmer depend on for advice on the fertilizer he buys? Some pertinent answers to this question are contained in the results of a recent survey by an independent research organization employed by Nitrogen Division, Allied Chemical. Motivations which influence fertilizer buying were studied in four midwestern states. PART I of the results has already been distributed and PART II is now available. To obtain your free copy, simply request Farm Fertilizer Survey, PART II, from Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N.Y.

TANK TRUCK DELIVERY. In addition to operating the largest fleet of railway tank cars in the industry for shipment of nitrogen solutions, Nitrogen Division, Allied Chemical, also makes deliveries in some areas in tank trucks like that shown above. The high-pressure tanks have a capacity of 4,575 to 5,090 gallons and the trucks are equipped for loading and unloading.

HERE'S THE BIG LINE OF Arcadian NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

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NEWS about the TRADE

Nitrogen Division Names 2

George B. Meredith has been appointed vice president in charge of production and Frank O. Agel has been named vice president in charge of development

G. B. Meredith

F. O. Agel

for the Nitrogen Division, Allied Chemical & Dye Corp., New York.

Mr. Meredith has been director of production, supervising operation of Nitrogen Division's four plants. Mr. Agel previously was director of development, supervising the division's research and engineering program. He has been located at Nitrogen Division's Development Center in Hopewell, Va., and will continue in that location.

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Opposes Govt. Competition

The president of the Chemical Specialties Manufacturers Association, H. E. Peterson of Peterson Filling & Packaging Co., Danville, Ill., said recently that the association is opposing the manufacture by government agencies of products prepared and sold by its members.

Speaking at the group's annual meeting in December, 1957, Mr. Peterson said that in addition to competing unfairly with industrial and merchandising firms, the basic philosophy of competition by government personnel (in some cases captive prison labor) subsidized by taxes partially paid by the firms with whom they are in competition, is incomprehensible. The various excuses given for perpetuation of the policy, Mr. Peterson said, are ingenious. However, when these reasons are sifted down, it becomes apparent that often the only reason is empire building.

Mr. Peterson went on to say that the competition occurs on both the state and federal levels and warned that unless the trend is curtailed, it could spread to individual cities and municipalities.

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Wood Joins Taylor

Henry J. Wood has joined the Taylor Chemical Co., Aberdeen, N. C. Mr. Wood recently retired from Diamond Black Leaf Co. and was formerly with the Virginia-Carolina Chemical Co.

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Giant Fertilizer Unit

What is believed to be the world's largest stainless steel crystallizer for making ammonium sulfate has been constructed by Struthers Wells Co., at Warren, Pa. The crystallizer, which weighs more than 150 tons and is 82 feet high and 20 feet in diameter, is designed to manufacture about 300 tons of ammonium sulfate daily.

•

Stepan Moves Offices

The Stepan Chemical Co. general offices, formerly located at 20 North Wacker Drive, Chicago, have been moved to larger quarters at 427 West Randolph Street, Chicago. Ninol Laboratories, Inc., recently purchased by Stepan, have also moved to the new address.

Development laboratories of both Stepan and Ninol will be consolidated and located at the new address.

•

Rename Canada Association

The Plant Food Producers of Eastern Canada are now known as the Canada Fertilizer Association. The group will hold its annual convention at Manoir Richelieu, Murray Bay, Quebec on Aug. 20 to 24.

WACA Meeting April 22

The Spring Meeting of the Western Agricultural Chemicals Association will be held in the Biltmore Hotel, Los Angeles, on April 22, 1958.

Among the speakers scheduled at the meeting are: J. Earl Coke, vice president of the Bank of America, San Francisco, who will discuss the future of Western agriculture; Dr. Boysie E. Day, assistant plant pathologist, University of California, Riverside, who will present a progress report on weed control; and Dr. J. T. Thurston, assistant general manager, Phosphates and Nitrogen division, American Cyanamid Co., New York, who will tell of basic research in agricultural chemicals.

•

Emulsol Appoints Mather

Emulsol Chemical Corp., manufacturers of surface-active agents, Chicago, (division of Witco Chemical Co.) has added T. William Mather to its sales staff. Mr. Mather will make his headquarters in Emulsol's new Akron, Ohio, sales office.

Mr. Mather was formerly with Colton Chemical Co., as manager of product development and marketing research; prior to that he was a technical representatives of Atlas Powder Co. in its chemical division, serving a wide variety of industries.

•

Diamond Sells Garden Line

The house and garden line of insecticides and lawn chemicals of Diamond Black Leaf Products, a unit of the Diamond Alkali Co., Cleveland, has been sold to a newly-formed corporation, Black Leaf Products Co., Chicago.

Pending establishment of its manufacturing operations, Black Leaf

Products Co. plans to lease a portion of Diamond's plant at Louisville, Ky. Included in Diamond's house and garden line inventory and assets sold to the new firm were raw materials, formulated products, packaging and promotion materials, and the Black Leaf trademark and tradename.

Frederick H. Raedel, Jr., sales manager of consumer products for Diamond Black Leaf, and E. W. Bodensiek, advertising and sales promotion manager, are serving the new firm in the same capacities.

Diamond also has sold its plants at Waco, Texas, and Richmond, Va., which were previously used by the company for formulating Black Leaf.

National Retains Sanders

Omar Sanders has been retained by National Potash Company to assist in its sales activities. Mr. Sanders has been associated with the fertilizer industry for forty years. After sixteen years with Armour Fertilizer Works, Mr. Sanders became manager, in 1943, of the newly formed Fertilizer Industries, Incorporated. He remained in this position until his retirement last June.

Residues Summary

The second edition of the summary of Tolerances and Exemptions for Residues of Pesticide Chemicals has been released by the Food and Drug Administration of the U. S. Department of Health, Education, and Welfare.

The summary is intended as a reference for pesticide chemical manufacturers, food and drug officials, economic poison control officials, and agriculturalists. Specific tolerances and exemptions are listed alphabetically according to the common name of the pesticide.

Christensen Joins Mathieson

Maurice A. Christensen has been named field representative for the Plant Food Division, Olin Mathieson Chemical Corp., New York. Mr. Christensen will service farm accounts with agricultural chemicals in the Chandler, Ariz. area.

Before joining Olin Mathieson, Mr. Christensen was agronomist for the Hanna Ranch in Chandler. Prior to that he had been with the Soil Conservation Service in Chandler for five years.

Littooy Heads Colloidal

E. H. Littooy has been elected president of Colloidal Products Corp., Sausalito, Calif. In addition, C. E. Miller was named executive vice president, Stanley W. Strew was elected vice president, and Frank A. Brown is the new secretary-treasurer. R. I. Chandler continues as assistant secretary.

Formerly located in San Francisco, the company has recently moved to new facilities at Sausalito, Calif.

Merck Revamps Sales

Merck & Co., Rahway, N.J., has reorganized the sales and marketing area of its chemical division into four separately functioning departments. Each department will operate in specialized areas under the supervision of a marketing director.

Those appointed as directors by Merck are J. E. McCabe, agricultural products; R. W. Hayes, general products; H. P. Sarkison, medicinal products; and G. C. Moore, distributive products. Mr. McCabe previously had been director of market planning for the chemical division.

Kolker Starts Production

The Kolker Chemical Corporation has started production of high-quality, anhydrous Methyl Chloride at its new plant at Newark, N. J. The plant has an annual capacity of 4,500 tons of industrial methyl chloride.

Set CFA Convention Date

The 35th annual convention of the California Fertilizer Association will be held at the Ambassador Hotel, Los Angeles on Nov. 9, 10, and 11 1958. John Hooper of Wilson & Geo. Meyer Co., Los Angeles, has been named chairman of the convention program committee.

Diamond Boosts DDT Price

Technical grade DDT has been advanced in price by the Diamond Alkali Co., Cleveland. The company has announced a three cents a pound increase in carload and truckload prices of technical DDT effective immediately to spot customers and April 1 to contract buyers.

Diamond's new prices for flake and powdered material in bags are 22 cents and 23 cents per pound, respectively delivered to destination. The firm's price for DDT 50 per cent wettable powder in bags has been increased 1½ cents per pound.

To Expand Phosphate Mining

The Stauffer Chemical Co., New York, and its affiliate San Francisco Chemical Co. have announced that vast phosphate deposits north of Vernal, Utah, will be developed in the near future.

This Unitah County lode, with reserves estimated at 700 million tons, is amenable to open pit mining and can become the largest operation of that type in the western United States. It is located along the Vernal-Manila highway, just a few miles from the site of Flaming Gorge dam which, when constructed, could supply much if not all of the necessary electric power for the operation.

Billboards To Introduce New Package Designs

Outdoor billboards are being used extensively throughout central Florida to introduce new package designs for the complete line of fertilizer products offered by Chase and Co., Sanford, Fla. The packages, as well as the billboard, were designed by the Union Bag-Camp Paper Corp., New York.

Velsicol Appoints Schweiker

The Velsicol Chemical Corp., Chicago, has appointed Dr. George C. Schweiker to the new position of manager of research. Dr. Schweiker is responsible for the basic research programs of the Velsicol research and development department.

Schweiker

Dr. Schweiker previously was supervisor of polymer research for the Hooker Electrochemical Co. and has been an instructor in chemistry at Drexel Institute of Technology in Philadelphia.

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Upper Midwest Nitrogen

The Upper Midwest Nitrogen conference, held Feb. 20 to 22, at St. Paul, Minnesota, featured a panel discussion on the role of nitrogen in production potentials. Speakers on the panel were J. M. MacGregor and P. M. Burson, U. of Minnesota soils scientists; R. A. Young, soils research worker from North Dakota Agricultural College; and M. R. Teel, agronomist from Purdue University.

Also among the speakers at the conference were M. H. McVickar, chief agronomist for the California Spray Chemical Corp., Richmond, Calif.; Harold Macy, dean of the University of Minnesota's Institute of Agriculture; and George D. Scarseth, director of the American Farm Research Association, Lafayette, Ind.

Crop production possibilities for Minnesota soils were viewed by Charles Simkins, extension soils specialist at the U. of Minnesota. Ermond Hartmans, extension farm management specialist, discussed the economics of production potentials.

•

Farm Practices, Weed Control Feature of Western Conference

How profitable is skip-row planting? How do you combine cotton fertilization and irrigation for greatest profit? What's the latest information on low-cost weed control in cotton?

These are a few of the questions which were answered at the Western Production Conference held March 4-5 at the Cortez Hotel, El Paso, Texas. The conference was attended by farmers, research and extension workers, industry representatives, and others.

The practice of skip-row planting was discussed by Dr. Robert E. Briggs, agronomist at the Arizona Experiment Station, Tucson. Combining cotton fertilization and irrigation for greatest profit was examined by another agronomist, Dr. D. E. Longenecker of the El Paso Valley Experiment Station, Ysleta, Tex.

John H. Miller of the U. S. Cotton Field Station, Shafter, California, presented the latest information on low-cost weed control. Two other speakers covered other aspects of weed control in cotton.

Heads General Chemical

Irb H. Fooshee has been named president of General Chemical Division of Allied Chemical & Dye Corp., New York. He succeeds Chester M. Brown who was recently made vice president of Allied.

Fooshee

Mr. Fooshee was appointed executive vice president of General Chemical Co. in July 1957, following three years as vice president in charge of development. He joined General Chemical in 1947 as assistant to the president.

Prior to joining General Chemical, Mr. Fooshee was vice president of Neches Butane Products Co., Port Neches, Texas.

Taxicologist Testifies to No Ill Effects by DDT at Trial

A hearing called to determine whether Government agencies could be enjoined permanently from spraying insecticides on private property got under way in Eastern District Federal Court, Brooklyn, last month.

The first defense candidate testified before Judge Walter Bruchhausen on February 25th, stating "The amount of DDT absorbed by humans as a result of the gypsy moth spray program was so small as not to be measurable." This statement was made by government toxicologist, Dr. Wayland J. Hayes, chief of the toxicological division of the U.S. Public Health Service.

Dr. Hayes reported on a couple of prison experiments, in which inmates were subjected to large dosages of DDT, and suffered no adverse effects. The prisoners received 200 times the amount of DDT which would normally be ingested. One of the experiments involved 51 prisoners over an 18-month period.

Robert Cushman Murphy, naturalist and author, was the first witness for the plaintiffs who seek a permanent injunction to prevent future sprayings like last spring's gypsy moth eradication campaign in New York, New Jersey, and Pennsylvania. Mr. Murphy said that nature had been thrown out of balance on his Long Island estate by aircraft spraying DDT. Thirty property owners and ecological experts were expected to testify for the plaintiffs. The Federal and New York State Governments were expected to call twenty witnesses.

Opening statements were made before Federal Judge Walter Bruchhausen by Assistant United States attorney Lloyd H. Baker, Roger Hinds, representing the landowners, and Assistant Attorney General Irving L. Rollins, representing the state of New York.

Mr. Murphy testified that an aircraft spraying DDT made two passes over his shore-front property. Subsequently, he said, he discovered the death of a school of cold-tolerant tropical fish he was experimenting with to combat mosquitoes, frogs, toads, water spiders, and various insects. He said that "millions" of fiddler crabs died in a neighboring marsh and that this was especially unfortunate because they ate the eggs of starfish, which destroy oysters and clams.

Mr. Murphy conceded under cross-examination that he is not an expert on insecticides, pesticides, or poisons, and that he has not had the fish analyzed to prove that DDT killed them. At one point Judge Bruchhausen said that he would accept Mr. Murphy's testimony, "but I have some doubts about it."

Mr. Hinds charged that a num-

(*Continued on Page* 113)

HOW TO GET THE MOST FOR YOUR FERTILIZER MACHINERY DOLLAR

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Q - How much experience is built into the design?

A - You get the benefit of 84 years of practical fertilizer industry experience in each Sturtevant machine you buy. Unrivaled for fertilizer plant engineering know-how, Sturtevant originated the 'Unit' idea. Whether your need is for a replacement pulverizer or mixer, or a completely modern granulating unit, Sturtevant-engineered machinery always can be depended upon to fit your requirements like a glove.

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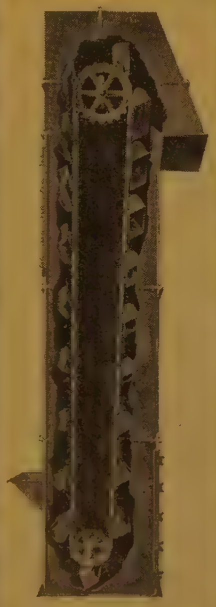
Q - How accessible is the machinery for clean-outs and repairs?

A - Clean-outs are a constantly recurring problem in the operation of a fertilizer plant. And minor repairs on hard-to-get-at machinery can consume hours of costly man and production time. Sturtevant's practical "Open-Door" design guarantees quick accessibility — for clean-outs and repairs. Any parts requiring cleaning or maintenance are quickly exposed by "One Man in One Minute".

For rugged, reliable, efficient machinery you can depend upon for years — or for engineering assistance in planning or upgrading your fertilizer unit — it will pay you to consult Sturtevant. Write to STURTEVANT MILL COMPANY, 123 Clayton St., Boston 22, Mass.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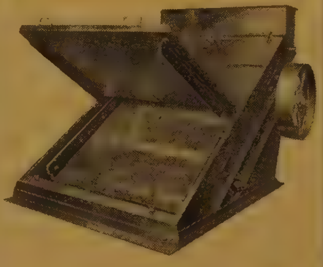
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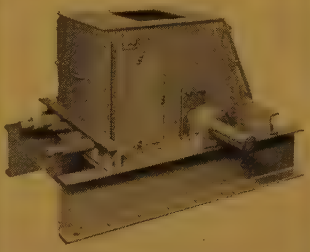
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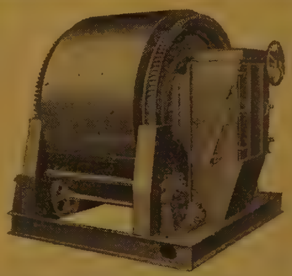
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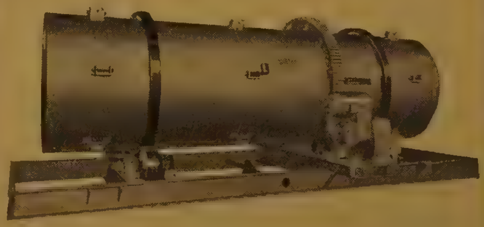
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Fulton Appoints Schoenbach

The Fulton Bag & Cotton Mills, Atlanta, Ga., has appointed Meno Schoenbach as advertising and sales promotion manager with headquarters in Atlanta. He also is responsible for the company's public relations program. Mr. Schoenbach joined Fulton in 1954 and has been in New Orleans for the past two years.

Recently all of Fulton Bag & Cotton Mills manufacturing and sales operations were consolidated at Atlanta. The company maintains sales offices and representatives throughout the U. S., however.

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Southwestern ESA Meeting

The sixth annual meeting of the Southwestern Branch of the Entomological Society of America was held in Houston, Texas, Feb. 10 and 11.

C. R. Parencia, Jr., C. B. Cowan, Jr., and J. W. Davis, of the Entomology Research Division, USDA, presented a paper dealing with field tests with systemic insecticides employed as cotton seed treatments in 1957: R. L. McGarr of the Entomology Research Division spoke about guthion and a DDT-endrin mixture for controlling the pink bollworm. The effectiveness of Chipman R-6199 against some cotton insects was reviewed by C. H. Tsao and G. T. Bottger of the USDA's Entomology Research Division.

Dr. Tsao also discussed a potentially important pest of cotton, *Lyonetiidae Lepidoptera*. Dr. Bottger and W. L. Lowry, also of the Entomology Research Division, discussed screening tests of some organic insecticides against cotton insects.

Granular insecticides for thrips and boll weevil control on cotton were discussed by R. L. Hanna, Texas Agricultural Experiment Station. C. A. Richmond and Dr. McGarr, Entomology Research Division, told of their field tests on Sevin against cotton insects.

Tests with American Cyanamid 12880 for systemic control of cattle grubs were described by R. O. Drummond, Entomology Research Division, USDA. Dr. Drummond also described field tests for control of cattle grubs with sprays of Bayer 21/199.

Knox Walker, Texas Agricultural Experiment Station, reviewed boll weevil control in 1957. Dr. Parencia, Dr. Cowan, and Dr. Davis described field tests with some of the newer insecticides and acaricides for control of the bollworm and spider mite.

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Stauffer Moves Florida Office

A regional sales office of the Stauffer Chemical Co. has been moved from Apopka, Fla., to Tampa, Fla. Formerly known as the Florida Insecticide Co., the office now goes under the Stauffer name. The new address is P.O. Box 5285, Tampa.

Gildersleeve Heads Penola

Stanley P. Gildersleeve has been elected president of the Penola Oil Co., New York, a marketing affiliate of the Esso Standard Oil Co. Mr. Gildersleeve succeeds Clarence M. Davison who retired on January 31 after more than 46 years with Esso and its affiliates. Mr. Davison has been president of Penola since 1941.

Vice president and general manager of Penola since 1952, Mr. Gildersleeve started as a lab assistant with Jersey Standard's scientific affiliate—now the Esso Research and Engineering Co.—more than 32 years ago. He was elected a director of Penola in 1950.

Pesticides Already Over-regulated, Says W. S. Hitchner

ENTOMOLOGISTS should pay careful attention to statements by scientists from other fields who are critical of any pest control operation, and efforts to present the full facts should be made when and where an opportunity is offered, according to L. S. Hitchner, executive secretary of the National Agricultural Chemicals Association, Washington, D. C.

Speaking as a member of a panel at the Georgia Entomological Society meeting at Sea Island, Ga., on Feb. 6, Mr. Hitchner said that growing criticism, through lack of information, seriously threatens both research and development of pest control chemicals. During the last six weeks, he said, restrictive legislation beyond any practical requirements has been introduced in four states. Relatively few state legislatures are meeting this year, Mr. Hitchner pointed out, but about one-quarter of them are considering restrictive legislation.

Mr. Hitchner reminded his audience that the sale and use of pest control chemicals already are extensively regulated by existing legislation which has added to the increased cost of research programs to develop new pest control materials. These programs, as well as the progress made by entomologists, are temporarily jeopardized by unsupported criticisms.

Scientific research by entomologists and other scientists is the basis of progress in whose benefits we all share, Mr. Hitchner said. One of our big tasks, therefore, he continued, is to keep everyone completely informed of what we are trying to do, how we are trying to do it, and the benefits the public can expect from improved pest control.

Mr. Hitchner said that we need to know about the fundamental physiology of insects and more about their life cycles. We need to know more about how chemicals and other control agents destroy insect life and we need to know much more about the distribution of insects throughout the world.

Preventive programs are rapidly being adopted by successful cotton growers, Mr. Hitchner pointed out. Taking a forward look, he said, it is our belief that better control programs, based on early protection, will minimize loss and reduce costs. Oftentimes when industry talks about preventive insect control programs, there are those who claim we want to unduly increase consumption or sales of our products. Mr. Hitchner said that a careful examination of pest control shows, however, that smaller quantities of materials are used in preventive programs than under emergency conditions.

Among the new fields listed by Mr. Hitchner where the knowledge of entomologists can contribute to the welfare of the general public were forest pest control and the control of insects, as well as weeds and brush, along highway rights-of-way.

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Frontier BHC Price Rise

Frontier Chemical Co., Division of Vulcan Materials Co., Wichita, Kans., has announced a price increase in technical benzene hexachloride effective April 1.

The new price, which applies to both high and low gamma BHC and includes export as well as domestic business, will be $0.00825 per lb. gamma unit, freight allowed in truckload or carload quantities. Frontier's present price is $0.0075 per lb.

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Montana Plant Food Meeting

Dr. A. H. Post, head of the department of agronomy and soils, Montana State College, Bozeman, told the Montana Plant Food Association's Fertilizer Dealers Meeting, Feb. 11 and 12, that ample quantities of phosphate should be added with nitrogen to forage crops to keep the phosphate content of the forage at optimum levels. Dr. Post stressed the need for quality of forage crops, as well as yield per acer. (See Photo, Pg. 75)

At the present time, Dr. Post said, the total fertilizer tonnage in the state on all crops is approximately 35,000 tons. There are 2,410,000 acres of forage crops alone in the state, however, which have a minimum potential of 100,000 tons of fertilizer.

Harry Kittams, assistant soil scientist at the college, discussed an alfalfa leaf analysis survey he conducted in a number of areas in Southwest Montana. He said that it is very likely that a paying response to fertilizer applications would be obtained with fertilizer treatments on these fields.

J. O. Reuss and D. E. Baldridge of the college, emphasized the need of a high fertility program for corn grown for silage. They suggested the use of about seven pounds actual N and two pounds actual P_2O_5 per ton of sileage produced.

F. T. Tremblay, Northwest representative of the National Plant Food Institute, emphasized the importance of soil testing and demonstration plots in promoting the proper use of fertilizer.

Newly elected officers were: President, Dean Travis Jr., J. R. Simlot & Co.; Vice President, George Mason, Montana Flour Mills; and Secretary-treasurer, Ray McGregory, Phillips Chemical Co.

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Clemson Pesticide School

The seventh annual pesticide chemicals school held February 25-26 at Clemson, S. C. was directed by Dr. J. H. Cochran, head, Department of Entomology and Zoology, and Dr. W. M. Epps, head, Department of Botany and Bacteriology, Clemson Agricultural College.

Among the topics featured at the 2-day session were reports on: (1) The use of antibiotics in the control of plant diseases and animal pests; (2) the latest report on the use of gibberellic acid; (3) a detailed discussion on such pests as the fire ant and soybean cyst nematode; (4) use of systemic insecticides in the control of animal pests; and (5) changes in pesticide recommendations for 1958.

The school is of interest to anyone concerned with the control of plant and animal insects and diseases, household insects, weeds, and rodents. It is of special interest to manufacturers and dealers in pesticides and pesticide equipment.

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Illinois Hist. Survey Centennial

On June 30, 1958, the Illinois Natural History Survey will pass its 100th anniversary of formal organization. The association since that period has rendered outstanding service in the field of natural history, especially in regard to the control of noxious insects, the control of diseases attacking floricicultural and ornamental plants, the development of forestry in Illinois, the management of fishes in ponds and streams, the foods and movement of waterfowl in Illinois, etc.

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Cyanamid Farm Newsreel

The farm and home division of the American Cyanamid Co., New York, is producing what is described as the first nationally syndicated TV newsreel designed for a farm audience. A preview of "Cyanamid Farm Newsreel" was staged by Cunningham & Walsh advertising agency last month in New York.

Allen Joins U. S. Potash

Allen

Ben M. Allen has joined the United States Potash Co., New York, as a sales representative in the company's southeastern territory. Mr. Allen will work directly under Robert H. Walton, manager of the Atlanta office for U. S. Potash.

A native of Atlanta, Mr. Allen was graduated from the University of Georgia in 1955 and has been associated with the C&S National Bank of Atlanta.

•

Grace Ups Urea Production

W. R. Grace and Co. is upping its annual production of urea at its Memphis, Tenn., plant by 20,000 tons. Expected annual capacity at the synthesis end of the urea plant will be nearly double its present output.

The expanded urea operations will require half of the plant's ammonia potential which is 250 tons daily.

•

Johnston Speaks at Ag Meeting

Insect pests contribute to many and are directly responsible for some of the problems of cotton production on the High Plains of Texas, H. G. Johnston of the National Cotton Council told the fifth annual Agricultural Chemical Conference, Feb. 27 at Lubbock, Tex.

The entomologist said rapidly changing production practices have made effective insect control even more important and, in many cases, more difficult. He added that these changes have caused a re-evaluation of certain phases of insect control programs.

Dr. Johnston said that breeders have made tremendous progress in developing earlier fruiting and maturing varieties of high quality cotton. But all the advantages gained may be—and often are—completely nullified by uncontrolled infestations of early season insects.

Thrips, aphids, fleahoppers, and spider mites are the pests most often involved in early season infestations. The intensity and duration of the infestation is extremely variable, he pointed out, and both determine the amount of damage that may be done.

Now...direct application of malathion on livestock...

...the first phosphate insecticide to
receive federal tolerances covering
use on cattle, hogs and poultry.

American Cyanamid Company, together
with State and Federal workers, developed
this important new market for your
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just 2 ways we're helping you sell:

New kind of insecticide for direct application on cattle, hogs and poultry

Effectiveness plus low toxicity to animals makes malathion the first phosphate insecticide recommended for control of external parasites

Now you can get *fast, sure* control of blood sucking, profit cutting pests with malathion, a phosphate insecticide you can apply *directly* to your livestock. Years of country-wide research have proved the effectiveness — and safety to animals — of this new practice. Together with its long-established use in and around animal shelters for flies, direct application of malathion gives you all-around insect control with one insecticide. This efficiency is made possible by malathion's unique combination of effectiveness against insects, fast killing action and low *toxicity* to man and animals.

Here is an outline of malathion use recommendations for livestock

For Cattle

Malathion can be applied by hand or power sprayers directly on cattle to control horn flies, lice and ticks. Malathion also can be used in back rubbing devices to fight lice and horn flies. Malathion should not be used on lactating cattle or calves under one month of age.

For Hogs

Malathion sprays can be used directly on hogs, as well as in pens and in litter for control of lice. Apply when needed. One application usually does the job.

For Poultry

Apply malathion directly on birds to control Northern fowl mites and poultry lice. Use sprays or dusts.

Spray malathion thoroughly on all poultry house surfaces to clean up Northern fowl mites, chicken red mites, poultry lice and flies. For mites and lice, dusts may also be used. For poultry ticks, use sprays.

Or, malathion as a roost paint will control chicken red mites and poultry lice. Apply as needed.

Malathion is not a brand name. It is the active ingredient in branded formulations offered by over 100 well known manufacturers. American Cyanamid Company manufactures the basic ingredient. For a detailed leaflet describing direct application on livestock, write to American Cyanamid Company, Insecticide Department NL1, New York 20, New York

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Mississippi Aerial Applicators Hold 2nd Annual Meeting

A two-day session highlighting the importance of the airplane in midsouth agriculture was held at the Edgewater Park Hotel, Edgewater Park, Mississippi, February 14 and 15. Mabry Anderson, Mississippi Valley Aircraft and president of the Mississippi Aerial Applicators Association, presided at the opening meeting.

All phases of an aerial applicators problems were discussed. James Lanier of Chemagro Corp. and Dr. Petty of Louisiana State University Medical School presented papers on the use of organic phosphates and their hazards. An insect control panel was moderated by A. G. Bennett, Mississippi Extension Service, and Dr. Marvin E. Merkel, USDA, Stoneville, Mississippi.

The proposals for the fire ant control program were discussed by Mr. W. R. Heard, USDA, Gulfport, Mississippi. The aerial applicators safety program panel was conducted by Frank Wignall, safety agent, and J. J. Werbke, agricultural specialist, both with the Civil Aeronautics Administration. The state aviation program of the Mississippi Aeronautics Commission, legislature, etc. was discussed by Bud Moore of the Mississippi Aeronautics Commission. Insurance and legal problems in agricultural aviation were discussed by Harold Hansen, far west general agency, Washington State.

Retiring officers for 1957 are Mabry Anderson, Mississippi Valley Aircraft, Clarksdale, Mississippi; Vic Sutter, vice-president, Vic Sutter Dusting Service, Greenwood, Mississippi; L. T. Wade, Jr., secretary-treasurer, South Delta Aviation Service, Rolling Fork, Mississippi. The newly elected officers for 1958 are C. Emery, president, Magnolia Aviation Service, Laurel, Mississippi; J. C. Dockery, vice-president, Dockery Aviation Service, Clarksdale, Mississippi; Ed Traweek, secretary-treasurer, Valley Flying Service, Indianola, Mississippi.

The Mississippi Aerial Applicators Association, while only two years old, has made many strides toward perfecting new techniques and quality in the application of agricultural chemicals. During this annual meeting, proposals for continued research work and better application methods and better quality work for the farmer were outlined.

●

Grand River Names Two

Stafford L. Beaubouef has been named southern sales supervisor for the Grand River Chemical Division of Deere and Co., Pryor, Okla. Mr. Beaubouef formerly was sales representative in the Louisiana, Arkansas, and East Texas area for the company.

Rush E. McCarty has been appointed to replace Mr. Beaubouef in that area as sales representative for the company's nitrogen products. He will headquarter at Shreveport, La.

●

Sales Association Appointees

Robert J. Roberts of Emery Industries, Inc., president of the Salesmen's Association of the American Chemical Industry, Inc., has announced that the association's board of directors has confirmed the appointment of the following committee chairmen for the coming year:

Admissions, John M. Glaze, Hooker Electrochemical Co.; Auditing, Walter Farley, Chas. Huisking & Co.; Educational, Leroy London, The DuPont Company; Employment, Cliff. Heathcote, Monsanto Chemical Co.; Entertainment, Paul E. McCoy, American Potash & Chemical Corp.; Golf, Frank R. Reynolds, Publicker Industries, Inc.; Publicity, Dwight Moody The Journal of Commerce; Sales Clinic, Raymond Tower, Westvaco Chemical Division of Food Machinery & Chemical Corp.; Welfare, George F. Smith, Millmaster Chemical Co.; Committee of Tomorrow, Vincent L. Rebak, Grace Chemical Co.

●

Discuss Applicator Problems

Gale F. Hanson, vice president and chairman of the Agricultural Activities Committee, National Aviation Trade Association, told the General Aerial Applicator Conference, held at the Adolphus Hotel, Dallas, Tex., recently, that the industry is facing such problems as: means of increasing safety; increased toxicity of chemicals: federal, state and private contract problems.

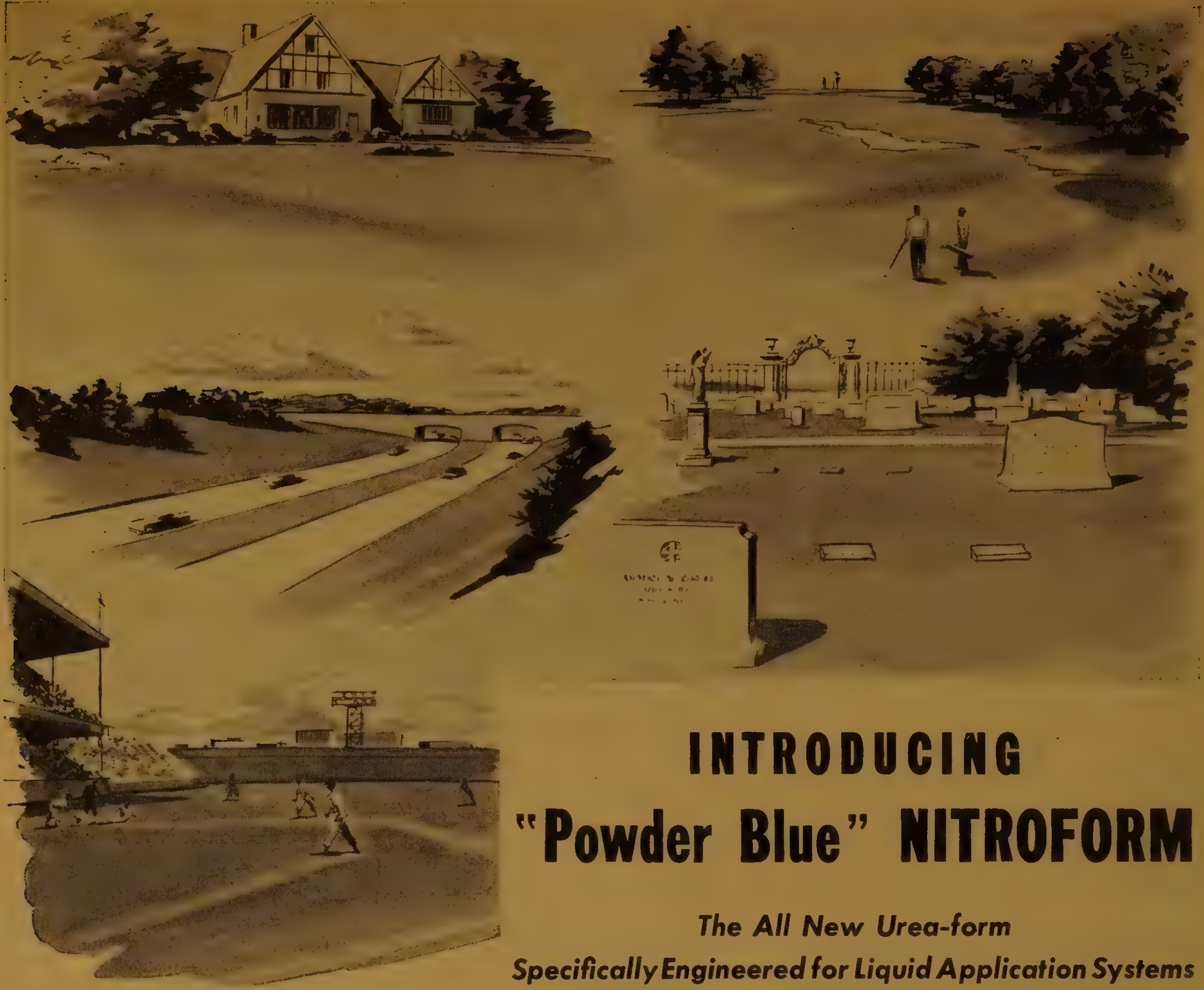
Warren Benedict, USDA Forest Service, another speaker at the conference indicated that in recent years the annual program of aerial application of insecticides has been running around one and one-half million acres. It will approximate that figure in 1958 he said.

The outstanding problems in aerial spraying stem from the side effects of chemicals, according to Ernest Grambo, USDA Forest Service, Missoula, Montana. He cited spray effects on fish and wildlife as well as on the food which fish and wildlife normally consume.

Kenneth Messenger, Aircraft and Special Equipment Center, USDA, Beltsville, Md., listed some problems encountered by his organization in 1957 spray programs and in intended contract requirements. Among the problems were: extreme delays by contractors starting projects, the use of too many inexperienced pilots, insufficient management supplied by contractors, and too much irresponsible flying.

Fertilizer Dealer Speakers

Among the speakers at the Montana Fertilizer Dealers Meeting were: (left to right) J. O. Reuss, assistant in soils at Montana State College; Dr. A. H. Post, head of the soils and agronomy department; A. F. Shaw, extension agronomist; F. T. Tremblay, NPFI; and Harry Kittams, assistant soil scientist. (Story Pg. 73)



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NITROFORM is the only source of urea formaldehyde nitrogen which can back up its effectiveness in mixed fertilizers with documented evidence.

"POWDER BLUE" NITROFORM is our newest addition to the line of Urea-forms. It has been designed to meet the specific requirements of custom lawn-spraying companies.

"POWDER BLUE" NITROFORM has the same long-lasting characteristics of regular "BLUE CHIP" NITROFORM, yet it can be easily dispersed in water and needs only gentle agitation to keep it in suspension.

"POWDER BLUE" NITROFORM can be applied to turf at rates 6 to 8 times higher than ordinary soluble fertilizers without causing any damage. "POWDER BLUE" NITROFORM can be applied once to give complete all-season feeding to turf. "POWDER BLUE" NITROFORM can quadruple the business capacity of custom spraying companies since it enables them to complete the entire season's feeding program for turf with just one call.

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La. Insecticide Use Drops

The big change between insecticides used in 1957 and 1956 in Louisiana for cotton and sugar cane insect control was the decrease in the amount, according to a report released by the Louisiana State University, Baton Rouge.

There were approximately 20,000,000 pounds of dusts and 560,000 gallons of spray concentrate reported sold during the year. This is a decrease in the amount of dust used, but a substantial increase in the quantity of syrays used. Cryolite and ryania were used for control of the sugar cane borer and nearly all other insecticides were used for the control of cotton insects.

Calcium arsenate led the dusts with more than four million pounds being sold. This was a drop, however, from the more than nine million pounds sold in 1956. Of the sprays, DDT at 226,619 gallons and methyl parathion at 183,280 gallons were the top sellers.

•

Name For Niagara 1240

Ethion has been approved as a common name for the pesticide chemical O,O,O',O'-tetraethyl S,S'-methylene bisphosphorodithioate by the American Standards Association, Inc. The compound previously had been referred to as Niagara 1240.

Ethion is a product of Food Machinery and Chemical Corp., Niagara Chemical Division, Middleport, N. Y.

•

Thomas P. Cooper Dies

Dr. Thomas P. Cooper, retired Dean of the University of Kentucky's College of Agriculture and Home Economics, died at Lexington, Ky., last month at the age of 76.

•

Canners' Short Course

The 11th annual Canners' and Fieldmen's Short Course was held Feb. 5 and 6 in Minneapolis, and was featured by a variety of talks on soil management, fertilizer problems, and pest control.

Speakers were from the University of Minnesota, the Metropolitan Mosquito Control District, the Minnesota Canners and Freezers assn., several universities from other states, the National Canners Assn., and several commercial concerns.

•

Meyer Moves Seattle Office

The Seattle office of Wilson & Geo. Meyer & Co., Western distributors of agricultural and industrial chemicals, has occupied new quarters at 318 Queen Anne Avenue, Seattle. The San Francisco firm also maintains district offices in Portland, Salt Lake City and Los Angeles.

Farmers Plant Producing

The new plant of the Farmers Liquid Fertilizer Co. at Patterson, Ark., has started production of high-analysis liquid fertilizer under the brand name of "Gro-Mor." In addition to the balanced fertilizer, the firm will offer anhydrous ammonia, aqua ammonia, and Uran.

The company has been licensed by the Tennessee Valley Authority to use a TVA process of liquid fertilizer production.

GLENDON — at Glendon, N. C.

Offering:

INSECTICIDE GRADE PYROPHYLLITE

- ph 6 to 7
- 30 lbs. per cu. ft.
- avg. particle size below 5 microns
- non-alkaline
- chemically inert
- 92-95% passes a 325 mesh screen
- non-hygroscopic

Insecticide Grade Pyrophyllite is the ideal diluent and conditioner for all types of insecticidal dusts. As it is non-hygroscopic, dusts compounded with Insecticide Grade Pyrophyllite will not absorb moisture. Nor is there any tendency even during extended storage, for the carrier to separate from the active ingredients.

Insecticide Grade Pyrophyllite has superior adhering properties, and because it is difficult to wet, it holds well on the plant leaves even during rain. When used as a carrier for products to be dusted by airplane, it settles rapidly minimizing drift, waste of materials, etc.

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NATIONAL PLANT FOOD INSTITUTE

reports complete results of study on "Farmer's Attitude Toward Fertilizer"

NATIONAL Plant Food Institute has just released complete results of a consumer research study designed to determine farmers' attitudes toward the use of fertilizer. The problem at hand NPFI indicated, is of course to find ways and means to persuade farmers to use fertilizer at most profitable rates—particularly in view of the fact that the industry is capable of producing substantially more fertilizer than farmers are now using, and the fact that farmers are using less than half as much as research shows they should use for optimum returns. NPFI hopes, by applying the results of the survey, to aid industry members to promote increased and more efficient use of fertilizer.

The survey was conducted by National Analysts, Inc., of Philadelphia, one of the nation's leading consumer research organizations, using a representative sample of farmers, who operate farms of 100 acres or more, in four geographical regions. The questions they used in the survey included the following.

what are the customer's general characteristics?
what does he think about commercial fertilizer?
what sources of information about fertilizer does he consider practical?
with whom does he discuss his fertilizer problems?
what subjects does he discuss?
how does he go about deciding to use fertilizer?
how does he decide how much and what kind of fertilizer to use?

The most significant findings of the study, as summarized by NPFI, are as follows: (1) the average farmer's knowledge about fertilizer—as well as his general educational level—is much lower than previously had been suspected. (2) Many farmers want to improve their fertilizer practices and a surprisingly large percentage of them constantly are making efforts to do so. (3) Better educated farmers use more fertilizer. (4) A large proportion of the educational and promotional information on fertilizers now beamed toward farmers is not clearly understood and cannot be related by them to their own operations.

NPFI is tailoring its promotional program to the pattern suggested by the study, and intends to make the study available to state colleges of agriculture. It believes that the study will indicate to many colleges ways in which their programs can be made more effective.

For one thing, the survey seems to indicate that when a farmer receives information about fertilizer, which he understands and believes, he generally makes intelligent use of it. This would appear to point up the need for better communications and more basic education for both the farmers of today and farmers of tomorrow. Simple and effective informational materials are part of NPFI's enlarged program. Some of the other features on NPFI's new plans are listed at right. A more complete analysis of the problem and the NPFI program is available directly from the Institute.

What the Survey Showed

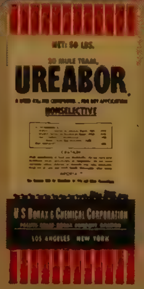
- Farmers tend to think of an investment in fertilizer as a commercial risk with uncertain benefits.
- Fear of adverse effects more often influences level of use than does the promise of economic reward.
- About half of all farmers mentioned bad effects when a rate of use approaching experiment station recommendations was suggested.
- The average farmer would use only slightly more fertilizer than he now is using, if he had "plenty of cash available and wanted to get the best investment for his time and money."
- The average farmer's knowledge about fertilizer is surprisingly limited—interviews showed the average farmer doesn't seem to understand clearly the meaning of analysis grade or ratio.
- About 2/3 of fertilizer users reported reading something about fertilizer, and indicated that hearing and reading about fertilizer was helpful . . . on the other hand, non-users of fertilizer did not think either was helpful.
- The average farmer is more likely to believe results and adopt practices he can see and interpret in terms of his own farming operation. But, only 25 per cent of those interviewed could recall having visited a fertilizer demonstration.

Action Planned by NPFI

- The soundness of principles upon which past programs have been based generally is substantiated by the study. However, results indicate not only a need for some shifts in emphasis but the existence of promotional opportunities which currently are not being fully exploited.
- NPFI will set up better communications with the farmers of today, to sell on a sound basis, more fertilizer *now*.
- Provide more basic education for both the farmers of today and the farmers of tomorrow to insure the future growth of the fertilizer market.
- Through its new field organization, NPFI plans to work closely with colleges and other interested groups in the development of simple and effective informational materials.
- NPFI will intensify its efforts to promote soil testing, and encourage continuing review of soil test administrative procedures and fertilizer recommendations by State authorities.
- NPFI plans to direct its expanding mass media efforts toward: localizing the information and services supplied to press, etc., enlarging distribution of news releases.
- Because fertilizer demonstrations appear to be an effective tool for influencing farmers to use fertilizer, NPFI will cooperate with agencies conducting these demonstrations, plus continuing its support of such pilot demonstration projects.

4 *easy ways to* destroy weeds

1



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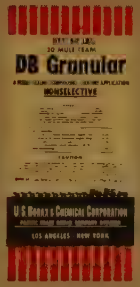
Nonselective. A granular complex of sodium borate and substituted urea... dust-free...for DRY application. Low rates of application are a big feature.

The PCB Spreader applies the low rates to best advantage and is available for $10.75 delivered anywhere in U.S.A.

2

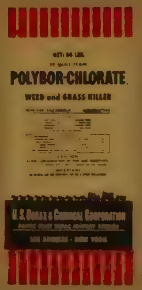


DB® Granular

A scientifically balanced formulation of 2,4-D and sodium borates...for DRY application. Kills deep-rooted noxious weeds—perennials and annuals—effectively and economically. The recommended low rates can be applied best with the special hand operated PCB Spreader.

(Not intended for control of grass)

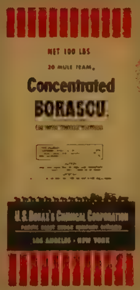
3



POLYBOR-CHLORATE®

A highly soluble powder for spray or dry application. Its double action quickly destroys vegetation on contact and through root absorption. Provides long residual effects. This is a general nonselective herbicide for controlling all types of vegetation.

4



Concentrated BORASCU®

A granular concentrated sodium borate ore for nonselective control of weeds and grasses. It is easily applied, by hand or with mechanical spreaders, in its dry form. Long residual action is a feature—may prevent regrowth for a year or more.

Whether you are concerned with Agriculture or with Industry...you need BORATE WEED KILLERS

Weeds incur danger and great economic losses...they steal from crops...they constitute a fire hazard without equal. Nonselective BORATE weed killers attack this menace most effectively by destroying roots and rhizomes and preventing regrowth for long periods. During our lengthy experience with borates for weed control, we have developed special weed killers capable of destroying all types of weeds and grasses under the many various local and regional conditions.

YOU GET ALL THESE FEATURES:

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TOXIMUL 102 AND 103. Used at concentration levels of only 2-4% this new emulsifier "team" gives flash emulsification and high stability for both chlorinated insecticides and herbicides. Less to inventory, too!

TOXIMUL P. Specially developed emulsifier for Parathion.

TOXIMUL MP. Highly effective in Malathion formulations.

TOXIMUL 250. Ideal for emulsifying Pentachlorophenol and CIPC.

TOXIMUL 500. Easy-to-Use "universal" emulsifier.

South Chicago Plant

Millsdale Plant (near Joliet, Illinois)

Stepan Chemical makes world's largest emulsifier shipment

Twelve railway tank cars of Toximul emulsifier . . . the largest single shipment of agricultural emulsifier ever made . . . were delivered by Stepan Chemical early this year. It was used in formulating 20,000,000 pounds of Toxaphene spray . . . also a record quantity . . . for Egyptian agriculture. Integrated production and close coordination of the three Stepan plants met a stringent delivery requirement.

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See Pesticide Sales Boost

If the Soil Bank continues for the next couple of years, pesticide sales will be boosted, according to *Chemical Engineering* magazine.

The magazine reports that the pesticides industry has high hopes that its product will profit at least for the next two decades. At the present time, however, the farmer's attempt to get maximum yields from land he has not put in the Soil Bank will result in his using greater amounts of agricultural chemicals.

Farm output in 1956-57 was approximately one-third greater than in 1940, with practically no increase in the number of acres planted. The industry feels, though, that a supply-demand balance may be reached in the 1960's and that farm output required in 1975 will be one-third larger than that needed in 1952-53.

This means that a greater utilization of land under cultivation is necessary, and a greater insurance that farm products will be brought to harvest. That is where the pesticides industry's long-range hopes lie, the magazine states.

•

New Methoxychlor Label

E. I. du Pont de Nemours & Co., Wilmington, Del., has prepared a new label for its Marlate 50 fifty per cent methoxychlor wettable powder insecticide. The new label text is registered with the USDA and is in accord with the action of the Food and Drug Administration in setting a zero tolerance for methoxychlor in milk.

Directions for the use of methoxychlor on dairy cattle cover only direct dusting.

•

IMC Corporate Promotion

The International Minerals & Chemical Corp., Chicago, has launched a corporate promotion campaign designed to gain added recognition in the business community for the company and its product family.

"Living Minerals" is the theme of 21 four-color, full-page and double spread insertions appearing in *Time*, *Newsweek*, and *Business Week* this year.

Dominant feature of the promotion is micrographic reproductions in full color of "Living Minerals" from the long list of minerals mined and processed by IMC.

•

Formwalt Is General Manager

William S. Formwalt has been named general manager of agricultural chemicals activities of the Pennsalt of Washington Division, Pennsalt Chemicals Corp., Tacoma, Wash.

Mr. Formwalt was engaged in heavy chemical and export sales until 1956. For the past year he served as assistant to the vice president of agricultural chemicals activities. He maintains his office at Tacoma.

•

Cites Research Need

The USDA's Vegetable Research and Marketing Advisory Committee, at its annual meeting in Washington, D. C., Feb. 3 to 6, called for a detailed program of specific fundamental studies of vegetable crops to help build the nation's store of necessary fundamental knowledge.

For example, in farm research they called for strengthened investigations of vegetable breeding, nematodes, and pesticide residues.

•

Named Chief Agronomist

Nitrogen Division, Allied & Dye Corp., New York, has appointed Dr. Harvey J. Stangel to the newly-created position of chief agronomist.

Dr. Stangel joined Nitrogen Division in 1953. Since 1954 he has been midwest agronomist, with offices at Omaha. In his new position he is located at Nitrogen Division's main office in New York.

•

Perkins Heads Co-op. Plant

Clarence P. Perkins has been named manager of the St. Joseph, Mo., fertilizer plant of the Consumers Cooperative Association. Mr. Perkins previously had been associated with the Virginia-Carolina Chemical Co., Richmond.

•

European Chemical Report

The Chemical Products Committee of the Organization for European Economic Co-operation has issued a 200 page report on the Chemical Industry in Europe. The report deals with the situation during 1956 and the first six months of 1957.

The book contains a survey of trends in the chemical industry, and a number of studies of various sectors of the industry. It is available in the U.S. from the O.E.E.C. Publications Office, 1346 Connecticut Ave., N.W., Washington 6, D.C.

•

Western Cotton Conference

The 1958 Western Cotton Production Conference, being held in El Paso, Texas, March 4 and 5, is co-sponsored by the National Cotton Council and the Southwest Five-State Cotton Growers Assn. in cooperation with the El Paso Valley Cotton Assn. and other groups.

A panel on controlling cotton diseases is comprised of Dr. Philip J. Leyendecker, New Mexico A. & M. College, discussing seedling diseases; Harold W. Lembright, Dow Chemical Co., San Francisco, discussing nematodes; and Dr. John E. Chilton, Arizona Fertilizers, Inc., Phoenix, speaking on verticillium wilt. Other subjects on the program cover weed control, insect control, defoliation of cotton, and fertilization.

•

More Urea Capacity

Revamping at the South Point, Ohio, plant of Nitrogen Division, Allied Chemical & Dye Corp., will boost urea capacity from 80,000 to 110,000 tons a year. When work is complete, the Division's total urea capacity will be 220,000 tons a year, largest in the industry.

New Fertilizer Plants for Coastal Chemical in Production

THE Coastal Chemical Corp. has started operations at its new fertilizer facilities on the Bayou Casotte Harbor at Pascagoula, Miss., less than ten months after construction got underway.

The first product to be shipped by Coastal was sulfuric acid from what is believed to be the world's largest single sulfur burning unit. (Capacity 600 T/D H_2SO_4). The sulfuric acid plant was designed by the Titlestad Corp., New York. Still under construction at Pascagoula is an oleum plant which will produce 80,000 tons of oleum per year. The sulfuric acid plant will receive all of its sulfur in the molten state and has storage capacity for over 4,000 tons of molten sulfur.

The ammonium phosphate facility, which is designed to produce 350 tons per day of granular fertilizer, is the first of its kind in the United States. The design was furnished by the Saint Gobain Co. of Paris, France. The plant will produce wet process phosphoric acid in the Saint Gobain reactor system.

The off-site facilities at the new plant consist of a dock for receiving raw materials and shipping some finished products by water, an "A" frame type storage building for receiving and storing 10,000 tons of Florida phosphate rock, a rock grinding plant, approximately 15,000 tons of bulk and bagged fertilizer storage, plus bulk and bagged material handling facilities.

The plant is located on a recently completed channel that is 1,000 feet wide and 32 feet deep. The Coastal Chemical Corp. will receive phosphate rock from Florida and molten sulfur from the Louisiana-Texas area by water. The company also is considering receiving and handling water-transported shipments of potash.

Coastal recently awarded a contract to the Chemical Construction Corp., New York, for an anhydrous ammonia plant and construction is expected to begin this month. Until the ammonia plant is completed, Coastal's ammonia will be furnished by its parent company, Mississippi Chemical Corp., Yazoo City, Miss. The Coastal Chemical Corp.'s main offices also are located at Yazoo City.

•

Named to New Position

John L. Thompson has been appointed to a newly-created position as director of planning and control for the Niagara Chemical Division, Food Machinery and Chemical Corp., Middleport, N. Y.

The new position is responsible for cost accounting, systems and procedures, and the office of the financial analyst and budget coordinator. Mr. Thompson, associated with several of the chemical divisions of Food Machinery and Chemical Corp. for the past 19 years, was most recently manager of accounting services for the chemical divisions at the firm's New York office. He is now located at Middleport.

Coastal Chemical's sulphuric acid plant and storage tanks are at the left and the phosphoric acid and ammonium phosphate fertilizer plant is at the right All equipment is weather-proofed and can remain in the open.

ENTERING
OUR
2ND CENTURY
OF
SKILL
VISION
PROGRESS

100
1858
1958
BEMIS

Bemis Marks Centennial

The Bemis Bro. Bag Co., St. Louis, is observing the 100th anniversary of its founding throughout 1958. The company was founded in 1858 in St. Louis by Judson Moss Bemis, grandfather of F. G. Bemis, the current president of the firm. In outlining his company's centennial year program, Mr. Bemis said, "We will honor what has gone before, but, in large measure, we will do so by rededicating our company to its second century."

The company's anniversary activities are under the general direction of a Centennial Planning Committee headed by A. H. Clarke, a retired Bemis vice president. A 7 by 12-foot exhibit that describes Bemis history, organization, and products has been developed for plants and offices and a 20-page Centennial booklet has been produced for open house use and for distribution to customers, suppliers, and plant-town community leaders.

Mr. Clarke pointed out that although projects and materials of a special nature have been developed for 1958, much of the company's observance will be carried on within the framework of regular company activties.

•

Cyanamid Appoints Two

The Farm and Home division of American Cynamid Co., New York, has appointed Ralph E. Weed as special representative in the Eastern Region and has named T. I. McCarty as manager of the Eastern Industry Sales District, succeeding Mr. Weed.

Mr. Weed, who has been associated with American Cyanamid for 11 years, will handle special accounts. Mr. McCarty will be responsible for sales of the company's animal feed and food products in 18 states. He joined Cyanamid a year ago.

AMMONIA

By the Push-button Process

Ammonia plant start-up operations are virtually a matter of "push-button" routine with Chemico; for Chemico has designed and constructed more than 50 ammonia plants in the last 40 years.

While new-comers to the field are constantly running into costly difficulties and delays with unreliable and even untried processes, Chemico designed plants are profitably producing an estimated 25% of the world's synthetic ammonia. Investors in the chemical industries may be interested to learn that despite the proven performance and countless advantages of Chemico's ammonia processes, it frequently costs less to build a Chemico Plant.

Write today for Chemico Bulletin #357 which lists the alternate feed stocks and methods for gas purification and production in the making of ammonia.

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Southern Weed Conference Officials

Newly-elected officials of the Southern Weed Conference which met in Memphis Jan. 12 to 15 are, left to right: Dr. John T. Holstun, Stoneville, Miss., a conference representative to the Executive Committee of the Weed Society of America; Dr. Walter K. Porter, Jr., Baton Rouge, La., secretary-treasurer; Dr. E. G. Rodgers, Gainesville, Fla., a representative to the Weed Society of America; and Dr. Richard Behrens, College Station, Texas, president of the Southern Weed Conference. V. S. Searcy of Auburn, Ala., who was named vice-president of the Conference was not present for the picture.

Test MGK Repellent In Dairy

Test results released recently by Oklahoma State University indicate that the addition of MGK Repellent 11 increases the efficiency of a standard pyrethrum base insecticide by three to five times.

In the tests, a herd of 60 dairy cattle was divided into two groups. One group was sprayed with standard pyrethrum formulation and the other group was sprayed with the same formulation, fortified with .2 per cent MGK Repellent 11. The researchers report that satisfactory control was obtained over three common species of flies with the repellent-fortified spray, and spraying for this group was necessary only every third day. Insect count was significantly lower than that of the control group.

MGK Repellent 11, a product of McLaughlin Gormley King Co., Minneapolis, was tested at Pennsylvania State University and is said to have exhibited a wide range of effective repellency against horn flies, stable flies, horseflies, mosquitoes, and gnats.

•

Elect Sloan To CFA Board

James F. Sloan, president of the J. F. Sloan Co., Salinas, Calif., was elected to the board of directors of the California Fertilizer Association at a meeting in San Francisco recently.

Sloan's election brings to full strength the twelve-man board. Other directors of the Association are Jack Baker, Bandini Fertilizer Co., Los Angeles; Lowel W. Berry, The Best Fertilizers Co., Oakland; Fred R. Bryant, Brown and Bryant, Shafter; Frank A. Easton, Sunland Industries, Inc., Woodland; Howard H. Hawkins, Golden State Plant Food Co., Glendora; William G. Hewitt (C.F.A. President), Pacific Guano Co., Berkeley; Earl R. Mog, Growers Fertilizer Co., Stockton; Arthur W. Mohr, California Spray-Chemical Corp., Richmond; M. M. Stockman, The Mountain Copper Co., Ltd., San Francisco; and John N. Williams, General Fertilizer and Supply Co., Chula Vista.

•

New Herbicidal Compounds

The Heyden Newport Chemical Corp., New York, has started commercial production of a new group of herbicidal compounds based on 2,3,6-trichlorobenzoic acid in recently completed facilities at its Fords, N.J., works.

The new herbicide plant is Heyden Newport's first commercial application in the field of agricultural chemicals of its technology in the manufacture of chlorinated cyclic compounds. Herbicides based on the new compounds are said to show outstanding promise for control of bindweed and other deep-rooted perennial weeds in agricultural lands and industrial areas. Their effectiveness against persistent weed species at economic dosage levels has been demonstrated in a cooperative program of several years duration with weed control authorities in states where weeds of this type are a problem in land management.

In addition to studies in the U.S., results observed by investigators in other parts of the world promise widespread acceptance of these herbicides, according to Heyden Newport. A world-wide marketing program, effective commencing this year, is now under preparation and will be announced shortly. The new herbicides will be made available for commercial use in the U.S. during the 1958 growing season.

•

Soil Fertilizer Conf. in Calif.

A statewide Conference on Proposed Forest Soils Fertilization research was held at Sonora Inn, Sonora, California, on February 28. Jointly sponsored by the National Plant Food Institute and the Soil Improvement Committee of the California Fertilizer Association, the conference attracted more than one hundred persons interested in forest and watershed management. The University of California participated.

Qualified technicians from the Universities of the west and from the lumber and fertilizer industries, reported on results to date of forest soil fertilization research now going forward in other parts of the world, with emphasis on our own Pacific Northwest area.

•

Sulphur Outlook for 1958

Demand for sulphur in 1958 should just about equal 1957 demand, according to executives of sulphur companies quoted in a review of the market carried in the February 11th issue of the New York *Wall Street Journal*. Some fertilizer manufacturers are predicting higher fertilizer sales this year than last, it is reported, which would result in heavier sulphur consumption. They base hope for increased fertilizer sales on "last year's soil building rains in many rural areas, plus the prospect that many farmers may put additional land into the Federal Soil Bank. Farmers tend to buy more fertilizer to boost crop yields on lower acreage left in production."

Any rise in sulphur usage for fertilizer, however, may be offset by lower consumption in other items, such as steel making.

How Rapid Delivery of Sinclair Nitrogen Products

CAN SAVE YOU TIME AND MONEY

Rapid—on-time—delivery to your plant is an important reason why you should order nitrogen supplies from Sinclair. It can make the difference between filling an order at a profit or losing a sale and customer good will.

A big, new nitrogen plant at Hammond, Indiana, is in the center of the nation's rail and truck transportation network. Large storage facilities in this key location mean that your order can be filled for fast delivery when you need it.

For fast, low-cost delivery of nitrogen solutions, anhydrous ammonia and aqua ammonia call on Sinclair. Write or phone . . .

Dino, the Sinclair Dinosaur, says,
"Fertilize for greater farm profits. That's what I tell 'em in the farm ads, too".

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155 North Wacker Drive, Chicago 6, Illinois – Phone Financial 6-5900

Even if consumption should hold its own, or even go up slightly, domestic producers still must face growing Mexican competition. Gulf Sulphur, for instance, is projecting a possible 50 per cent gain in shipments over last year's 170,000 tons. Likewise, Pan American Sulphur, which shipped 678,000 tons in 1957, may ring up "somewhat higher" sales this year, one company official said.

•

New Diamond Compounds

The Diamond Alkali Co., Cleveland, O., has developed six new chlorinated compounds utilizing p-xylene as the basic raw material. The new compounds are being produced on a pilot-plant scale at Diamond's organic chemicals plant in Newark, N. J.

Three of the new products are ring chlorinated and three are chain chlorinated. They can react further in such unit processes as chlorination, chloromethylation, nitration, sulphonation, and oxidation. The chlorine in the chain reacts with hydroxyl, alkoxy, aryloxy, nitrile, isocyanate, amino, thio, and other groups.

•

Walsh Is Penola VP

John J. Walsh has been elected vice president of Penola Oil Company, a marketing affiliate of Esso Standard Oil Company. He succeeds Stanley P. Gildersleeve.

Mr. Walsh joined the New York sales organization of Esso Standard in 1934 and became a lubricating-oil specialist three years later. He has been with Penola since 1946 and has been manager of the company's Wholesale Lubricating Oil Department for the last six years.

•

Schulz Joins Velsicol

Kenneth L. Schulz has been appointed technical sales representative for Indiana and Illinois by the Velsicol Chemical Corp., Chicago. Mr. Schulz, who will headquarter in Lincoln, Ill., will be responsible for sales of insecticides and solvents in his territory.

Mr. Schulz formerly was with Pfister Associated Growers as assistant sales manager and later was sales manager of Fuller Seed Co., a grower unit of Pfister.

•

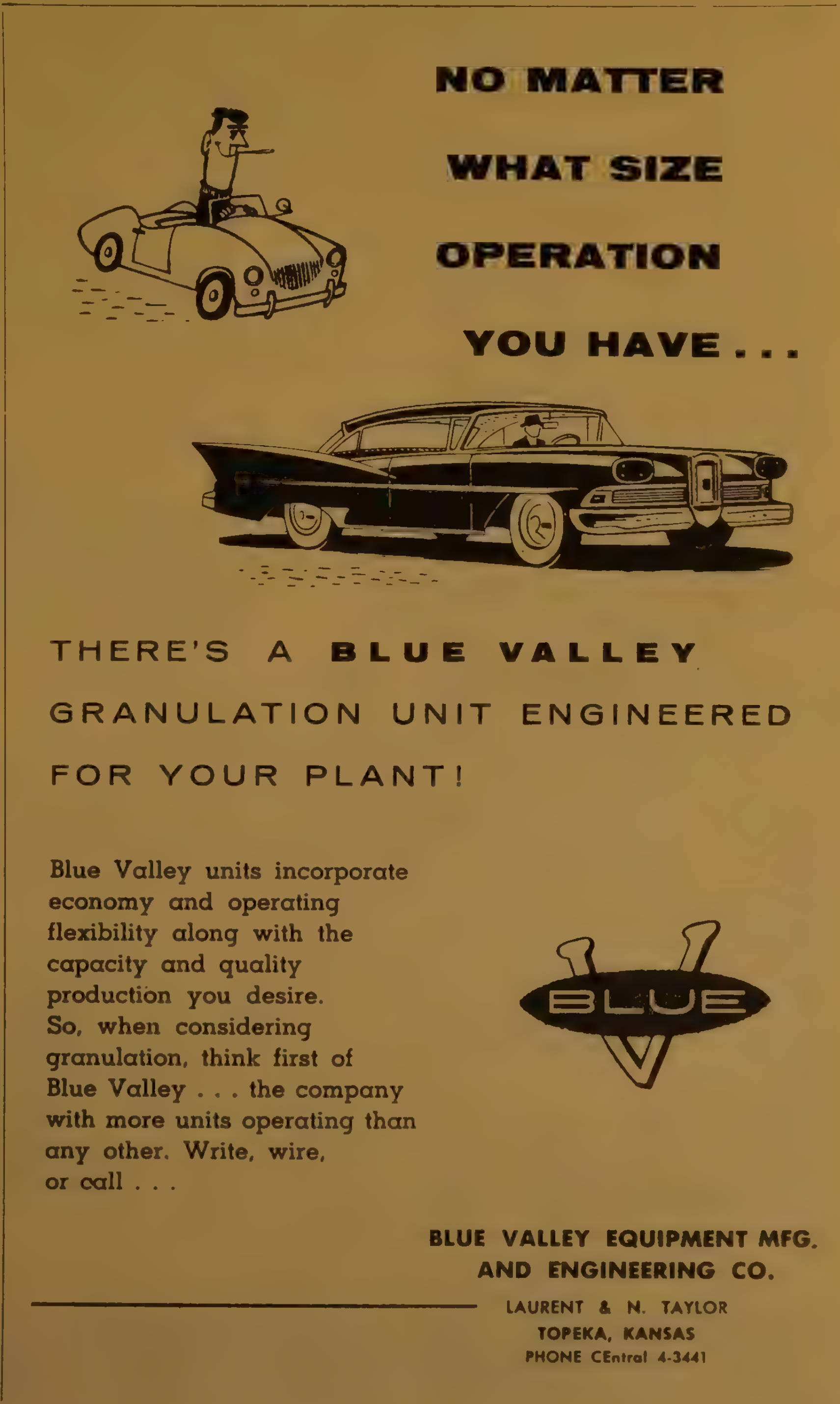
Russell H. Dunham Dies

Russell H. Dunham, first president and chairman of the board of Hercules Powder Co., Wilmington, Del., died last month following a cerebral hemorrhage. He had retired as president of Hercules in 1939 but remained as a director until March 1956.

Three Texas Firms Merge

Three Texas firms—The Smith Co.; The Smith Co., Pearsall Division; and the Giles Chemical & Fertilizer Co.—have merged to form the Smith Company of Uvalde, Uvalde, Texas.

The corporation will be headed by S. C. Smith as president, W. W. Plowman, Jr., vice president, and D. H. Speir, secretary-treasurer. The new firm manufactures and distributes fertilizers and insecticides.



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TRITON

Calspray International Conf.

Agricultural scientists from twenty-two nations conferred in Madrid, Spain, in late January, on the subject of crop disease control, at a week-long meeting arranged under the auspices of California Spray-Chemical Cie. Francaise, a subsidiary of California Spray-Chemical Corporation. Conference rooms, in the manner of U. N. meetings, were equipped for simultaneous translation of speeches in French, English, Spanish and German.

According to Norbert B. Van Buren, Calspray's Eastern Hemisphere manager and president of Cal-France, the conferences were originated to exchange and discuss research and practical field information on improved methods and new uses for metal-free organic fungicides to improve yield and quality of a great variety of crops—grapes, citrus, fruit, coffee, vegetables, ornamentals, etc.

"The first conference, held in 1954 in Germany and attended by representatives from neighboring countries, proved to us that many companies welcomed this opportunity for closer collaboration in research," says Van Buren. "Attendance has grown each year to include countries as far apart as Finland and South Africa. This year the Western Hemisphere was represented by both Central and South America as well as the United States."

Subjects of reports and discussions were grouped under five headings: Aboriculture; Viticulture; Vegetables and Ornamentals; Seed and Soil Treatments; Physiological Effects of Orthocide (captan).

Speakers and topics included: D. Hunnam, Murphy Chemical Co., Ltd., England, "The Control of Gloeosporium Storage Rots of Apples by use of Orthocide"; P. Dauget, Esso Standard, S.A.F., France, "Results of 1957 Tests for Control of Apple and Pear Scab"; T. W. Reed, California Spray-Chemical Corp., U.S.A., "Orthocide on Citrus"; A. Kaparis, Esso Standard, Morocco, "Captan on Legumes in Morocco"; L. P. Flipse, G. Lightermoet & Zoon N. V., Holland, "Use of Captan in Dutch Fruit Growing"; L. Zobrist, Dr. R. Maag, A. G. Switzerland, "Phaltan"; M. Venezia, Bombrini Parodi-Delfino S.A., Italy, "Research on Conservation of Table Grapes with Bentonite and Orthocide 50"; C. Barbera, Macaya, S.A., Spain, "Action of Captan on Alcoholic Fermentation"; K. Roeder, Schering A.G., Germany, "Experimental Work with Captan in Viticulture"; H. Blanc, S.A.F., France, "Field Tests—Comparative Influence of Captan and Copper on Physiology of Grape Vines"; K. Bagger-Hansen, Nordisk Alkali, A.S., Denmark, "Vegetables and Agriculture"; J. Destrebec, Ste Chimique & Industrielle Marocaine S.A., Morocco, "Use of Orthocide 50 on Tomatoes"; L. P. Flipse, "Results with Captan Against a Leaf Disease on Endive"; K. Bagger-Hansen, "Three Year's Test Work with Captan Seed Treatment of Peas"; E. I. H. Strugeon, Standard Oil Co. of South Africa, "Report on Experiment with Jolt Treatment on Tomatoes"; L. P. Flipse, "Bulb Treatments and Side Effects of Captan"; R. Zapf, Resident Entomologist, California Spray-Chemical Corp., San Salvador, Central America, "La Quema of Coffee Plants Caused by Phoma Costaricensis N. Sp."

Dr. Reed, assistant manager, Research and Development and M. E. Weirenga, foreign manager, represented California Spray-Chemical Corporation, U.S.A.

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Urea Plant For Pakistan

The Japanese Government is expected to approve the export of a $25 million urea plant by Kobe Steel Works and four other firms for use by the Pakistan Industrial Development Corp.

The huge urea plant, for which the five Japanese firms will provide facilities, machinery, and technical services, will be located at Dacca, capital of East Pakistan, and will turn out a total of 106,500 tons of urea a year, utilizing natural gas.

•

V-C Names Two To Board

The Virginia-Carolina Chemical Corp., Richmond, has elected as members of the board of directors David K. Wilson, president of the Cherokee Insurance Co., Nashville, Tenn., and Oliver R. Grace, Serling Grace & Co., New York.

Also, Richard E. McConnell, V-C secretary since 1956, has been given the additional duties of treasurer. Russell L. Haden, Jr., general manager of the chemicals division since December, has been elected vice president.

•

Continental Can To Display

The Shellmar-Betner Division of Continental Can Co., New York, will show its complete line of flexible packages and materials at the Packaging Materials & Machinery Exposition, March 25-28 in Atlantic City.

The Shellmar-Betner display will include the new metallized paper development, polyethylene "Zip Cord" bags, "Flex-On" film for close-fitting poultry packages and other recent division achievements.

•

Hudson Is Project Manager

Wells E. Hudson has been named project manager for the Commercial Development Department of the Pittsburgh Coke & Chemical Co., Pittsburgh.

Prior to his new appointment, Mr. Hudson served as vice president-general manager of the Great Lakes Chemical Corp., Manistee, Mich. In his new position, Mr. Hudson is charged with evaluating and coordinating assigned projects involving new products or enterprises under study by the company's Chemical Group.

•

Award To Pfizer Poster

Charles Pfizer & Co., Brooklyn, has been awarded first place in the agricultural classification at the 26th annual competition of outdoor advertising art, sponsored by the Art Directors Club of Chicago. The winning Pfizer poster advertised feeds containing Pfizer's Vigofac.

Bemis Names Ray As Manager

The Bemis Bro. Bag Co., St. Louis, has appointed W. J. Ray as manager of the company's multiwall bag plant in Mobile, Ala. Mr. Ray, a former supervisor of multiwall bag sales and a member of the St. Louis General Sales Division, was named assistant manager of the plant last year. He succeeds C. E. Harward, who retired last month after 32 years with Bemis.

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Moore Heads N. A. Cyanamid

Dr. L. P. Moore has been elected to succeed F. S. Washburn as president of North American Cyanamid Ltd., Toronto, a wholly-owned subsidiary of American Cyanamid Co., New York.

Mr. Washburn will devote full time to responsibilities as general manager of Cyanamid's Phosphates and Nitrogen Division.

Dr. Moore, who has been assistant general manager of Cyanamid's Plastics and Resins Division, will maintain his headquarters in Canada. He has been associated with the parent company since 1934.

●

Dow Opens Dallas Office

The Dow Chemical Co., Midland, Mich., opened a new sales office in Dallas, Texas, last month. Donald P. Camp, former head of chemicals sales with the company's Houston office, has been appointed manager of the new office.

The Dallas office is Dow's 18th in principal cities throughout the country. It handles all Dow products in a territory which includes the northern half of Texas, all of Oklahoma, and southeastern New Mexico.

●

Cotton Conf. at El Paso

New research findings to improve quality and lower production costs will be featured during the 1958 Western Cotton Production Conference at El Paso, Tex.

The program will open with an analysis of the world cotton situation by E. D. White, associate director, Office of Food and Agriculture, International Cooperation Administration, Washington, D.C. The analysis will include the domestic and foreign factors which have a bearing on total cotton consumption and how they affect consumption of U.S. cotton.

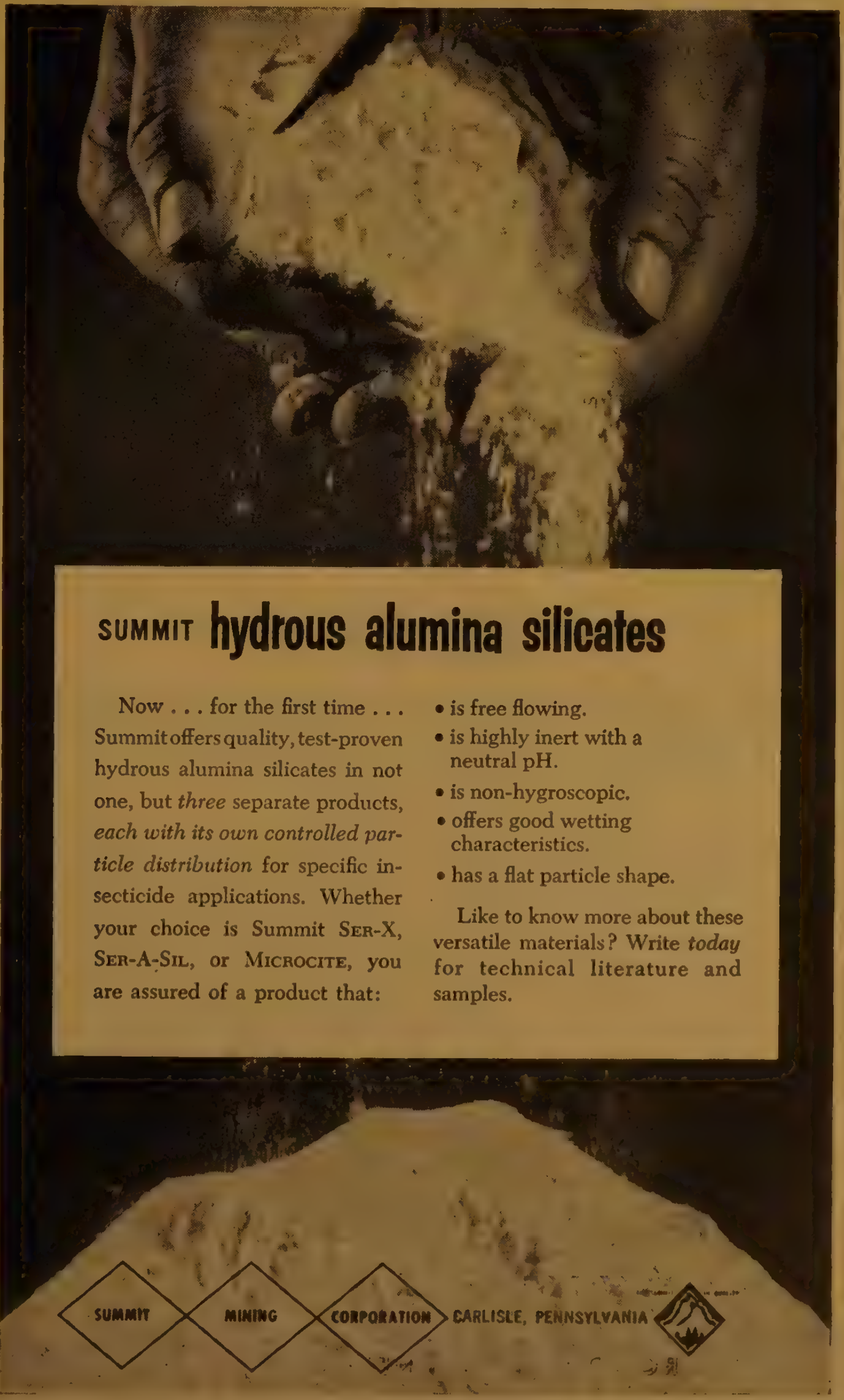
In addition, the conference will hear research reports on specific problems and production practices—soil compaction, irrigation, fertilization, skip-row planting, disease control, insect control, weed control, and controlling cotton fruiting. Other subjects include defoliation, machine-picking, and latest developments in ginning upland and long staple cotton.

The conference is being co-sponsored by the National Council and the Southwest Five-State Cotton Growers Association in cooperation with the El Paso Valley Cotton Association and other cotton organizations, U.S. Department of Agriculture and land-grant colleges, the agricultural chemicals industry, and others.

Canadian Plant Operating

A $9 million anhydrous ammonia plant of Canadian Industries Limited at Millhaven, Ontario, started commercial production last month.

The new plant, the only one of its kind in Canada using fuel oil as a raw material, occupies 10 acres adjacent to the company's "Terylene" polyester fibre plant located on Lake Ontario 13 miles west of Kingston. Daily production capacity is 200 tons.



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Industry Meeting Calendar

March 4-5—Western Cotton Production Conference, Hotel Cortez, El Paso, Tex.

March 9-15—International Flower Show, New York Coliseum, New York City.

March 13-14—Oregon Feed and Seed Dealers Assn., Annual Convention, Multnomah Hotel, Portland, Oregon.

March 18-19—South Dakota Weed & Pest Control Conference, City Auditorium, Miller, S.D.

March 18-20—Western Weed Conference, Hotel Davenport, Spokane, Wash.

March 20-21—Pest Control Operators Conference, Michigan State University, East Lansing, Mich.

March 26-28—North Central Branch, Entomological Society of America, 13th Annual Meeting, Sheraton-Jefferson Hotel, St. Louis.

April 13-15—California Fertilizer Conference State Polytechnic College, San Louis Obispo

April 22—Western Agricultural Chemicals Association. Hotel Biltmore, Los Angeles.

April 30—Manufacturing Chemists' Assn. Precautionary Labeling Conference, Shamrock Hotel, Houston, Texas.

May 19-21—Chemical Specialties Manufacturers Assn., 44th Mid-Year Meeting. Netherland Plaza Hotel, Cincinnati, Ohio.

May 22-23—Soil Science Society of North Carolina, North Carolina State College, Raleigh.

June 9-11—Association of Southern Feed and Fertilizer Control Officials. Heart of Atlanta Hotel, Atlanta, Ga.

June 15-18—National Plant Food Institute, Greenbrier Hotel, White Sulphur Springs, W. Va.

June 25-27—Pacific Branch, Entomological Society of America, San Diego, Calif.

July 8-10—Pacific Northwest Plant Food Association, Regional Fertilizer Conf., Pocatello, Idaho.

July 18-19 — Southwest Fertilizer Conference and Grade Hearing, Buccaneer Hotel, Galveston, Tex.

Oct. 22-24—Pacific Northwest Plant Food Assn., Gearhart, Oregon.

Oct. 28-29—Northwest Garden Supply Trade Show sponsored by the Oregon Feed and Seed Dealers Assn., Portland, Oregon.

Oct. 29-31—National Agricultural Chemicals Association Bon Aire Hotel, Augusta, Ga.

Nov. 9-10—California Fertilizer Assn. 35th Annual Convention, Ambassador Hotel, Los Angeles.

Nov. 24-25—Eastern Branch, Entomological Society of America, Lord Baltimore Hotel, Baltimore.

Dec. 1-4—Entomological Society of America, Sixth Annual Meeting, Hotel Utah, Salt Lake City, Utah.

Dec. 9-11—Chemical Specialties Manufacturers Assn., Sixth Annual Meeting, Commodore Hotel, New York.

Dec. 26-30—American Association for the Advancement of Science, 125th Annual Meeting, Washington, D. C.

Continues as FMC Consultant

Russell B. Stoddard, formerly manager of the Fairfield Chemical Division of Food Machinery and Chemical Corporation, is retiring from active service with the company, Dr. Carl F. Prutton, FMC Executive Vice President announced February 14th. Mr. Stoddard now will serve FMC on a part-time basis as consultant in his specialty of pyrethrum chemicals and other pesticide materials and will devote himself to outside business interests as well.

Russell Stoddard

Mr. Stoddard has been a driving force in the insecticide industry not only during the past four years with FMC, but with other major insecticide producers for more than 20 years. When he shifted his interest from essential oils to insecticides in the early 30's, Mr. Stoddard's first aim was to find a new source of rotenone root, then grown only in Malaya and Java. Due to his successful efforts, today's major source is Peru.

A few years later, seeing the advantages of pyrethrum as an insecticide, Mr. Stoddard turned his attention to the difficulties besetting this industry, including chronic short supply and a high and widely fluctuating price. About the time of World War II, research efforts at purifying pyrethrum, sparked by Mr. Stoddard, coincided with increased military need for insecticides. A further development, also pushed by Mr. Stoddard, was pyrethrum aerosol bombs based on purified, concentrated pyrethrum.

Interested in the possibility of making pyrethrum even more potent through synergism, Mr. Stoddard, encouraged the research efforts that led eventually to discovery of piperonyl butoxide. Also interested in improving the source of supply of pyrethrum, grown chiefly in Africa, Mr. Stoddard encouraged experiments in growing it on the slopes of the Andes. In spite of obstacles, the attempt was successful. FMC's Fairfield Chemical Division now obtains some of its pyrethrum flowers from plantations in Ecuador.

As a consultant with FMC's Chemical Divisions, Mr. Stoddard will be called on to contribute his unusually broad experience to various phases of FMC's insecticide program, which includes the manufacture of organic pesticide materials, the development and promotion of new applications in the insecticide field, and refinements in aerosol applications.

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- European Red Mite
- Two-Spotted Mite
- Plum Curculio
- Red-Banded Leaf Roller
- Fruit Tree Leaf Roller
- Tarnished Plant Bug
- Stink Bug
- European Apple Sawfly

Pears
- Plum Curculio
- Fruit Tree Leaf Roller
- Codling Moth
- Tarnished Plant Bug
- Stink Bug

Peaches, Nectarines, Apricots, Quinces
- Oriental Fruit Moth
- Plum Curculio
- European Red Mite
- Two-Spotted Mite
- Tarnished Plant Bug
- Stink Bug

Extensive field tests under practical conditions have demonstrated the consistent and efficient control of these insect pests. A full season GUTHION spray program can even eliminate extra spray applications required to combat spot infestations.

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Nitrogen Solutions

for fertilizer manufacturers

GRANULATION and ammoniation, and fertilizer manufacture using nitrogen solutions are discussed in a technical booklet* for the fertilizer manufacturer just issued by the Sohio Chemical Co., Lima, Ohio. The 50-page booklet, written by Sohio's technical service department, is designed for day-to-day use in plant operations. It contains a 16-page section on actual manufacturing operations with nitrogen solutions, plus basic information on various nitrogen solutions.

Observing the increasing use of nitrogen solutions in fertilizer manufacture, Sohio prepared the booklet as a basic technical guide. They point out that nitrogen solutions are economical sources of ammonia, nitrate and urea nitrogen in an easily handled form . . . that the materials yield fertilizers with improved physical characteristics and handling qualities.

In the opening section, dealing with "manufacturing with nitrogen solutions," it is stated that the "amount and type of solutions to use for ammoniation depends on seven factors: (1) the amount of neutralizing ammonia in the solution; (2) the amount of dissolved nitrogen salts; (3) the water content of the solution; (4) the amount and kind of acidic material in the mixture; (5) atmospheric conditions; (6) plant operating conditions, and (7) desired nitrogen content of end product." Further discussions consider each of the factors further, with more elaborate reviews on the uniformity of ammoniation and absorption.

In discussing reversion, Sohio's technical staff remind the manufacturer that "an excess of free ammonia may cause reversion of phosphates to forms less available for plant growth. If this revision is excessive, it can be costly. But a cost comparison of reversion may show more of a saving with low-cost solutions (as compared with solid forms of nitrogen) than is lost from the reversion of phosphates. "The cost advantage of nitrogen solutions to the mixer makes it advisable to use the maximum possible amount of ammonia without excessive reversion reactions." Factors involved in controlling reversion are: temperature and moisture.

An interesting property of urea, reported in this booklet, is its action as a conditioning agent. Urea is said to replace certain "high cost conditioners and prevents hard caking while adding water-soluble nitrogen." Urea helps reduce bag set of mixed fertilizers by changing the shape of ammonium chloride crystals. Fern-like crystals of ammonium chloride are formed by the reaction of ammonium nitrate and potassium chloride. These crystals tie fertilizer particles together and increase bag set. When 25 to 50 pounds of urea are used per ton of fertilizer, the ammonium chloride will form cube-shaped instead of fern-shaped crystals. These cube shaped crystals have a weaker binding action between particles of mixed fertilizer, and bag set is thereby reduced.

In a section of granulation vs conventional mixing, the advantages of ammonium nitrate and urea are defined, with improved agglomeration as one of the main features of ammonium nitrate or urea as the nitrogen source. Methods of calculating solution quantities, converting plant food contents to a dry-weight basis and other conversion factors are outlined in a section on formulation. At the same time, Sohio reminds the reader that it will help the formulator determine the most profitable method of formulation through a free cost analysis service.

Brief sections on liquid mixed fertilizers, and handling nitrogen solutions give the reader a comprehensive picture on use of solutions in fertilizer manufacture.

No discussion of nitrogen solutions or fertilizer manufacture would be complete without consideration of safety factors involved in the use of these materials. Thus Sohio in 3 of the 16 pages stresses handling safety, plant safety, personnel safety, and of course first aid. Specific information on anhydrous ammonia, aqua ammonia, and ammoniating solutions gives the reader the basic precautions to be observed in using and handling these materials.

A final section of the booklet includes product information sheets on various nitrogen solutions used in fertilizer manufacturer, as well as aqua and anhydrous ammonia. The information sheets list the following information for each solution:

shipping data
composition by weight
nitrogen content by weight
physical properties
vapor and specific gravity curves

Individual product information sheets as released by Sohio may be added to the booklet to keep product information up to date.

Requests for booklets should be addressed to the Agricultural Service Director, Sohio Chemical Co., PO Box 628, Ft. Amanda Rd., Lima, Ohio.

•

S. Korea Fertilizer Plant

Three West German firms, Lurg, Demag, and Siemens, have been awarded a $23.5 million contract by the South Korean government to construct a fertilizer plant at Nanju, south of Seoul.

Work is scheduled to begin in May this year and is expected to be completed by September, 1960. The plant will produce 85,000 tons of fertilizer annually.

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*This is the second booklet for the fertilizer manufacturer issued by Sohio Chemical Co. The first booklet "How Liquid Fertilizers are Made" was described on page 124 of the February, 1958 issue of *Agricultural Chemicals*.

BREVITIES

The Chase Bag Co., Chicago, has appointed George W. Williams as acting manager, and E. M. Bond as sales manager, of its branch in Dallas, Texas.

AC

James B. Fawcett will become associate director of the Rutgers University Extension Service in Agriculture and Home Economics on July 1. He will succeed Lindley G. Cook whose retirement becomes effective June 30.

AC

The American Agricultural Chemical Co., New York, has leased the major part of the twelfth floor in a building being erected at 100 Church St. in New York.

AC

Michigan Chemical Corp. has reported net sales of $9,571,000 for 1957. This was an increase of 44 per cent over 1956. Sales for 1956 were $6,641,000. Net income after taxes for 1957 was $753,000 as compared to $356,000 in the previous year.

AC

The Eighth Annual Northwest Garden Supply Trade Show, sponsored by the Oregon Feed and Seed Dealers Assn., will be held Oct. 28-29 in the Masonic temple, Portland, Oregon.

AC

Bart J. O'Hearn, western district sales manager of Union Bag-Camp Paper Corp.'s multiwall bag division, died of a heart attack recently in Denver, Colo. He had been with Union Bag since 1935.

AC

A. N. Weeks, director of production for the Bemis Bro. Bag Co., St. Louis, was elected vice president in charge of production at the annual meeting of the Board of Directors last month. Mr. Weeks joined Bemis in 1919.

George C. Cook has been named manager of chemical market research and development for the U. S. Industrial Chemical Co., division of National Distillers and Chemical Corp., New York.

AC

The American Mineral Spirits Co., New York, is offering Amsco Hot Shot Insect Killer in a newly-designed 16-ounce aerosol can.

AC

Joseph H. Ward has been appointed a sales representative in the Industrial Chemicals Division of Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.

AC

The Pacific Coast Borax Co. division of United States Borax & Chemical Corp., New York, has received the Open Pit Mine of the Year award from *Mining World* publication for an outstanding construction and engineering job on the company's Boron, Calif., mine.

AC

R. W. Strickland, vice president of the Texas Gulf Sulphur Co., New York, has been named general manager of the company.

AC

Dan J. Forrestal has been appointed director of public relations for the Monsanto Chemical Co., St. Louis.

AC

J. M. Bulger, USDA, Entomology Research Division, Hoboken, N. J., retired recently after more than 34 years of service.

AC

India's Coffee Board is exporting 2,000 tons of coffee in exchange for fertilizer from Communist East Germany. The fertilizer includes potash and rock phosphate needed by Indian plantations.

The Shea Chemical Corp., New York, a manufacturer of phosphorous and its derivatives, has announced that its net sales for the fiscal year ended Nov. 30 were $20,554,705 compared to $10,237,628 for 1956. Earnings per common share rose from 52 cent in 1956 to $1.35 in 1957.

AC

B. R. Putnam, Jr., has been appointed manager of the petrochemicals department of American Cyanamid Co.s' Organic Chemicals Division. Mr. Putnam has been with Cyanamid since 1947 and has been manager of market development since 1955.

AC

Dominion Fertilizers, Ltd., has begun construction of a new superphosphate plant at Port Maitland, Ont. The plant is located at the Lake Erie mouth of the Grand River.

AC

The Sodom Potash Corp., Israel, expects to double its potash production with machines ordered from West German firms. The new equipment should be available in about a year and should raise monthly output from 5,000 to 11,000 tons, most of it for export purposes.

AC

The American Agricultural Chemical Co., New York, has named A. P. McKeown as chief chemist of the company's chemical control laboratory at Carteret, N.J. Mr. McKeown formerly was with the firm's Pierce, Fla., chemical control laboratory.

AC

Harold C. Doellinger has been named assistant to the chairman of O. M. Scott & Sons, New Canaan, Conn. Mr. Doellinger joined Scott in 1939.

AC

Chinese output of ammonium sulphate in 1957 was estimated at 755,000 tons. When the construction and expansion of eight fertilizer factories provided for in the first five-year plan is completed, the Chinese expect to produce 1,800,000 tons of nitrogenous and 600,000 tons of phosphatic fertilizers a year.

Name Thornton Director

James F. Thornton has been elected a director of Combustion Engineering, Inc., Chicago. Mr. Thornton is president of the Lummus Co., New York, a partly-owned affiliate of Combustion Engineering.

■

ACS Lists April Program

Richard Wistar, head of the Mills College department of physical sciences, Oakland, Calif., has been named general chairman of the 133rd national meeting of the American Chemical Society, which will be held in San Francisco, April 13 through 18.

Twenty-one scientific and technical divisions of the society are sponsoring sessions. Chemical advances against disease, recent progress in nuclear energy, and new developments in science education are among the subjects of some 1,500 reports to be presented at the meeting. Chemical contributions in many other fields such as food processing, nutrition, agriculture, and sanitation also will be described at 200 half-day sessions.

■

A. Scharwachter Dies

Albert A. Scharwachter, 61, executive vice president of the Arizona Chemical Co., was killed last month in an accident that occurred in Winter Park, Fla.

■

APS Offers Jubilee Volume

In connection with the Golden Jubilee Anniversary, celebrated this year by the American Phytopathological Society, a series of outstanding symposia by internationally-known authorities will be presented at the meeting of APS and the AIBS in Bloomington, Indiana, August 24-28. Symposium topics cover a wide range of fields of basic interest to many biologists, and include significant achievements in the following: fungicidal action, systemic fungicides, physiology of parasitism, structure and multiplication of viruses, pathogenicity and disease resistance, soil microbiology, biology of root disease fungi, nematology, disease epidemiology, and historical and developmental aspects of plant pathology.

A volume of approximately 1000 pages containing all 50 papers on the program of symposia, as well as contributions by chairmen of symposia and discussion leaders, will be published by APS. The book will be titled, "Plant Pathology — Problems and Progress 1908-1958." The price will be $8.50. Orders should be placed with the American Phytopathological Society, PO Drawer 1106, New Haven, Connecticut.

Officers of the American Phytopathological Society during this Golden Jubilee Anniversary are: president, Paul Miller, USDA, Beltsville, Md.; president-elect, Glenn S. Pound, University of Wisconsin, Madison; vice president, W. C. Snyder, University of California, Berkeley; secretary, W. B. Hewitt, University of California, Davis; treasurer, Saul Rich, Connecticut Agricultural Experiment Station, New Haven; editor in chief, Phytopathology, E. E. Wilson, University of California, Davis; and retiring president, George W. Fischer, Washington State College, Pullman.

Members of the fiftieth anniversary committee are: Wayne Bever, D. E. Ellis, J. G. Harrar, W. B. Hewitt, C. S. Holton, G. S. Pound (chairman), H. A. Rodenhiser, J. R. Shay, and R. H. Wellman.

Barden Clay Quiz

DO YOUR DUSTS HAVE GROUND ROLL?

Ground or plane dusts made with Barden Clay develop a "ground roll" covering the *underside* as well as the upperside of the leaf. Use Barden's low bulk density to modify heavy and abrasive diluents for maximum quality and best performance at low cost. Barden is the industry's kaolin standard for a carrier-diluent in wettables and dusts; for an anti-caking conditioner in prilled fertilizers, and 93-94 percent sulfur.

These Barden features make it superior for all formulations: lowest abrasion...better sticking...high bulking value...greater uniformity...better deposits ...maximum economy...superior wettables.

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AP&CC Names Two

Frederick Marsic has been elected secretary of the American Potash & Chemical Corp., Los Angeles, and Henry DeArmond has been named assistant secretary. The officers were named following the election of Richard J. Hefler, formerly company secretary and assistant to the president, as vice president in charge of finance.

F. Marsic

H. De Armond

Mr. Marsic retains his other positions as assistant treasurer and office manager at company headquarters. Mr. DeArmond was administrative assistant prior to his present appointment. Mr. Marsic, who joined the company in 1913, is the longest service employee of American Potash.

•

Heads Fort Smith Division

H. E. Grahame, former production manager of the Fort Smith Cotton Oil Co., Fort Smith, Ark., has been named manager of the fertilizer division of that company.

Diamond To Terminate Lease

The Diamond Alkali Co., Cleveland, has notified the U.S. Government that the company will terminate its lease for the operation of the chlorine-caustic soda plant at the Pine Bluff Arsenal, Pine Bluff, Ark.

Diamond said that the move was due to availability of alternate facilities at Muscle Shoals, Ala., and Deer Park, Tex. Another major factor cited was the recent abandonment of DDT production at Pine Bluff by the Niagara Chemical Division of Food Machinery and Chemical Corp.

•

Blaw-Knox Named Cullen

J. P. Cullen has been named manager of clamshell bucket sales for the Blaw-Knox Co., Pittsburgh. Mr. Cullen has been West Coast manager for Blaw-Knox since 1951, with offices in San Francisco.

Joining Blaw-Knox in 1938, Mr. Cullen became eastern manager of clamshell bucket sales with headquarters in New York and serviced New York and Philadelphia areas for 13 years.

•

Fly Ash For Crops

Fly ash, the waste from burned pulverized coal, is now yielding substantial crops, according to the British Electricity Authority, London.

The ash, gathered from the authority's power stations, is covered with a three-inch layer of soil, sewage sludge, and industrial sludge. It has yielded nearly 13 tons per acre of grass and clover within two years.

•

Zuckerman Heads New Group

Dr. B. M. Zuckerman of the University of Massachusetts agricultural experiment station, East Wareham, Mass., has been named to head the newly-formed Northeastern Small Fruits Virus Conference. The conference was formed in December, 1957 to hold unofficial meetings to discuss progress in investigations of small fruit viruses. Elected vice-president of the conference was E. H. Varney of New Jersey. W. N. Stoner of Rhode Island was named secretary.

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Pikes Peak clay's exceptionally low moisture content and pH of 5 is your assurance of highest compatibility with malathion, methyl parathion, ethyl parathion or other phosphated insecticides.

Don't take chances with the stability of your finished product or concentrate. Use Pikes Peak clay. It is ideal for adjusting bulk densities in finished products and as a carrier for either phosphate or hydrocarbon concentrates. Pikes Peak clay also safeguards the free flowing characteristics of your product.

When you buy Pikes Peak clay you buy uniformity you can count on. It is ground to a fineness of 95% through 325 mesh. Of course, other sizes are available to meet your requirements.

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What we can do for you—

For 19 years we have followed the white line on just one road—solving engineering production and cost problems in the mixing, grinding and blending of almost any chemical. Pharmaceutical to pesticides. Elevating to bagging. This experience isn't worth anything to us or to you—unless you have a problem, or maybe you have a question to ask. We would like to get acquainted with you—just drop me a line or telephone. Talking is a pleasure and no obligation.

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We design and build complete plants

Insecticide plant in California—This is one of the many complete plants in this country and in South America built by the Poulsen Company.

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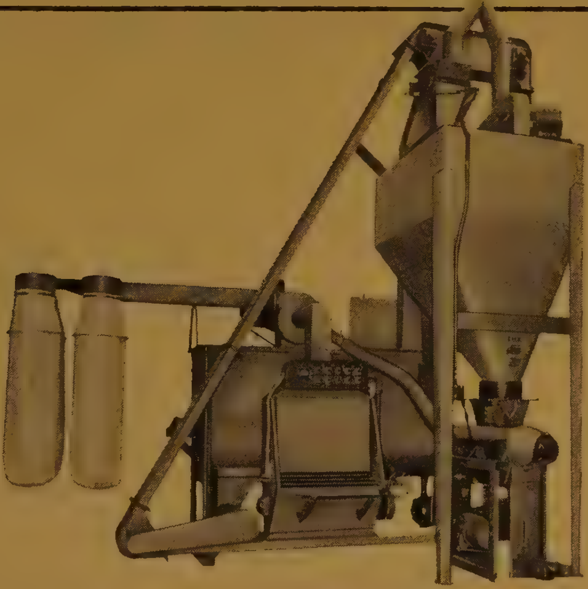
There are lots of new ideas in the chemical mixing field. We can help you redesign or relocate to save space, to secure labor economy, to secure more flexibility, and to reduce other costs. Please ask us for specific examples.

If you need specially designed equipment

You have a special problem. Perhaps you have had it for some time, and this problem requires a special something-or-other to solve it. Tell us the problem. There always seems to be a solution.



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The Poulsen Uni-Blender is our standard unit. It does almost everything but wind the clock. It mixes, elevates, grinds, and bags. Impregnates liquids with diluent mixes.

If your product deteriorates from long delays in shipping, you want to deliver a *fresh* product...the Uni-Blender can do it!

If you want to blend concentrate to field strength...if you would like to switch from custom-mixed to standard...Uni-Blender can do it!

This unit can handle six to eight, 1200 to 1500 lb. batches of field strength dust per hour. Other capacities are available.

Requires only 9′ by 12′ floor space and 16′ headroom. Factory pretested and ready to go to work for you just two days after delivery. Let's talk about it.

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of materials processing
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GENTLEMEN: *Please send me your technical bulletin about the standard unit Uni-Blender.*

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COMPANY___________________________
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CITY________________STATE________

Dust a problem in your material handling?

Here's how Michigan Tractor Shovels help Swift & Company

Swift & Company's plant food division at Madison, Wisconsin has the usual problem encountered in the processing of raw materials such as potash and superphosphate, and in handling the finished plant foods.

Equipment used in these processes is exposed to long hours of continuous maneuvering while handling the bulk materials. Equipment must be durable to withstand the heavy loads, quick stops, and grit of raw material acting on the machine. Swift officials report the one-yard 77 hp Michigan Model 75B shown has given excellent results in meeting these requirements.

Moving potash 110 ft from bin to mixer, Michigan is timed delivering 60 loads (97,200 lbs) per hour. Unit changes direction and speed at flick of power-shift lever. No clutching needed.

Works round-the-clock

"It is dependable,"says Madison Assistant Superintendent Harry Peeler. "It worked round-the-clock during our latest two-month rush season. Its only stops were to add fuel, inspect oil, and change operators. We've had no troubles with grit in the power-train . . . and no axle failures."

Ken Kremelling, veteran tractor shovel operator, says, "Michigan's torque converter helps you heap big loads fast. Low bucket-carry helps you keep what you load. Power steer takes you around turns fast. And power shif helps you start back for the next load fast."

See Michigan advantages for yourself

A trial in your plant will show you how these same advantages can pay off for you. Write for details on the size Michigan that interests you—6 10, 15, 20 or 27 cubic feet; 1, 1½ 1⅝ or 2¼ cubic yards.

Michigan is a registered trade-mark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division
2463 Pipestone Road
Benton Harbor 7, Michigan

CLARK® EQUIPMENT

Stepan Makes Largest Emulsifier Shipment

Designed ultimately for Egyptian agriculture, twelve railway tank cars of agricultural emulsifier recently were shipped to the Tampa, Fla. plant of the Stauffer Chemical Co. by the Stepan Chemical Co., Chicago. It is believed to be the largest single shipment of agricultural emulsifier ever made.

The Stepan emulsifier is being used in formulating an eventual 20,000,000 pounds of Toxaphene liquid spray, which Stauffer is supplying on contract to the Egyptian government. This also represents the largest single shipment of formulated insecticide ever made, constituting an entire shipload, and is for control of insects in the production of Egyptian cotton.

•

Named Chief Engineer

Ray L. Hobbs has been named chief engineer of The Best Fertilizers Co., Oakland, Calif. Mr. Hobbs is in charge of all maintenance and new construction engineering in the present plant at Lathrop, Calif. as well as in the new anhydrous ammonia plant now being built.

Mr. Hobbs formerly was employed for seven years by Union Oil of California as chief refinery engineering inspector and project engineer. For the past two years he has held the position of project engineer on new construction work and in corrosion and maintenance control for Brea Chemicals.

•

Chlordane For Crabgrass

Chlordane is being recommended by the Velsicol Chemical Corp., Chicago, for controlling crabgrass as well as soil and surface insects. Federal label acceptance was obtained for Chlordane against crabgrass in 1957.

By killing crabgrass seedlings, Chlordane stops crabgrass before it starts when applied before April 1. Indications are that fall application also is effective but the recommended timing at the present is the early spring, before any germination occurs. Soil insects will be controlled for a period of years by the Chlordane crabgrass application, according to Velsicol.

Fulton Names Sivori

Frank C. Sivori has been appointed manager of textile sales service for the Fulton Bag & Products Co., New Orleans.

A newly-formed corporation, Fulton Bag & Products Co., recently purchased the New Orleans and St. Louis plants of Fulton Bag & Cotton Mills, Atlanta. The New Orleans firm maintains sales offices in Atlanta, Chicago, Dallas, Denver, Kansas City, Minneapolis, and New York.

SULPHUR AND CHEMICAL COMPANY
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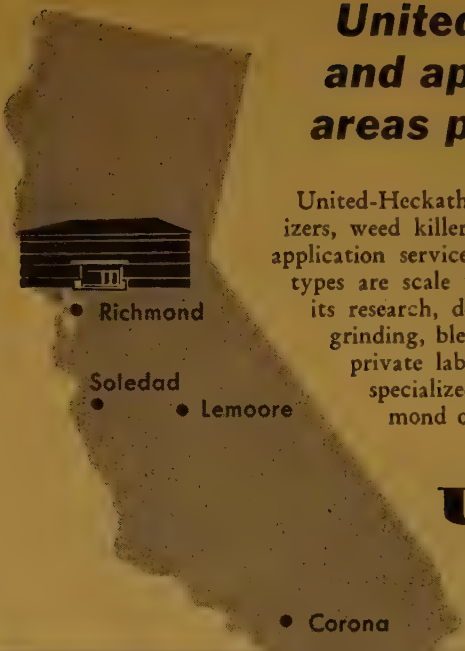
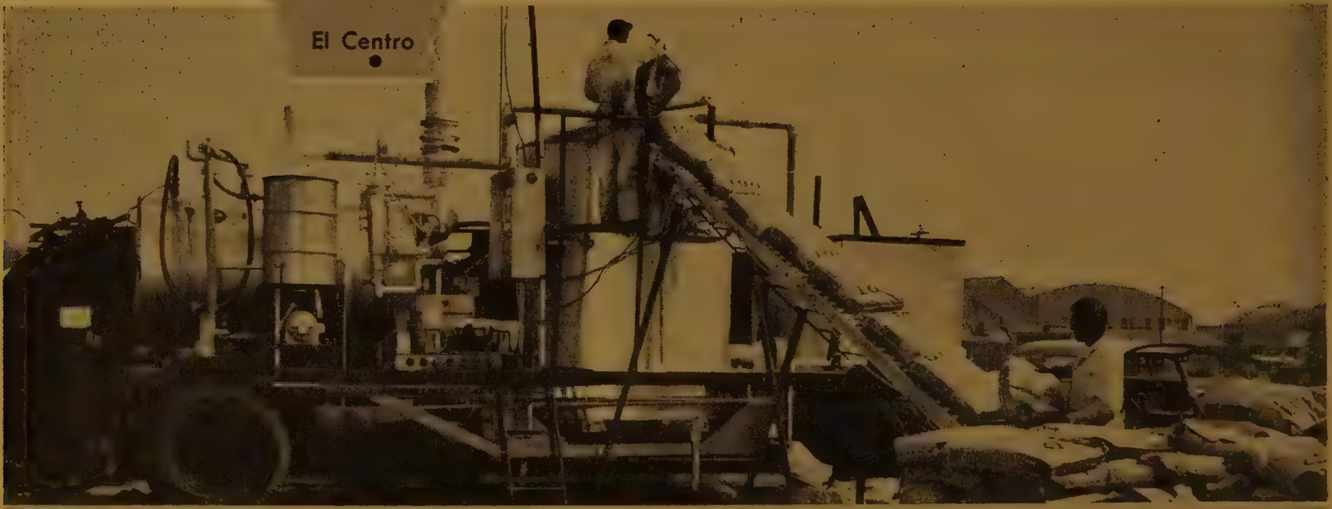
- TELEPHONE 4-2177



United-Heckathorn chemical manufacturing and application facilities in key agricultural areas provide first complete local service

United-Heckathorn permanent or portable plants manufacture insecticides, fertilizers, weed killers, fungicides and fumigants on location and offer aerial or ground application service. The portable plants may be transported to your job site. Both types are scale versions of United-Heckathorn main Richmond, Calif., plant with its research, development and control laboratories . . . vast facilities for mixing, grinding, blending of dry materials and liquids for bulk sales, custom processing, private label packaging . . . engineering for construction and maintenance of specialized processing and application equipment. United-Heckathorn, Richmond or any of the affiliated plants are at your service and invite your call.

UNITED Heckathorn



Portable plant compounding chemicals for aerial spraying of beet leaf hopper on 250,000 acres of Kettleman Hills, Calif.

Main Laboratory, Richmond. Chemists, machinists and other technical supervisory personnel accompany field jobs.

Extensive ground application work and chemical sales at Soledad, Calif. in the center of the "Salad Bowl" Salinas Valley.

Packaging and delivery for sales of agricultural chemicals for citrus crops, Corona, Calif.

Formulation and application, aerial and ground, in Imperial Valley, the world's largest vegetable growing center.

Formulation of dry & liquid insecticides for San Joaquin Valley, Lemoore plant near Fresno, center of cotton, potato & grape areas.

UNITED-HECKATHORN

Main office and plant: 600 S. Fourth Street,
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Phone: LAndscape 5-9210

Plants at Soledad, Corona, El Centro, Lemoore

Equipment, Supplies, Bulletins

Sturtevant Buln. on Micronizer

A new technical bulletin on the Micronizer is offered by Sturtevant Mill Company of Harrison Square, Boston. The booklet describes fluid energy grinding and gives typical grinding data for various materials. Information is also given on how to obtain custom or experimental fine grinding service from Sturtevant.

A cross-section drawing of the Micronizer is shown, and a flow sheet of a complete fluid energy grinding unit is included in the bulletin. Sizes, pressure requirements and capacities are tabulated.

•

Vulcan Interlocking Drums

Vulcan Containers, Inc., Bellwood, Ill., has developed a 55 gallon steel drum that will interlock with adjacent containers when packed closely together.

The key to the interlocking feature is the special design of the rolling hoops which are wider apart on one side of the can than on the other. When utilized, a group of the new drums can be handled by a standard lift truck, eliminating the need for wood pallets.

•

Hardwood Conveyor Apron

Robert A. Main & Sons, Inc., Paramus, N.J., has introduced a Hardwood Slatted Conveyor Apron in which hardwood slats are mounted on leather belts. The slats are said to increase the life of aprons. The company also can make aprons with metal, aluminum or plastic slats.

•

Huber Spray-Dried Carrier

The J. M. Huber Corp., New York, is offering a spray-dried form of Zeolex 7A. The spray-dried pellets of the silica pesticide carrier are said to yield higher absorptions and suspension values when air-milled or finely ground with toxicants in the formulation of high concentrate wettable powders.

The tiny spray-dried pellets are finer than instant coffee beads and revert to powder immediately during normal milling or grinding at the formulator's plant. In the new form, Zeolex 7A packs tighter and saves over 20 per cent in storage space.

•

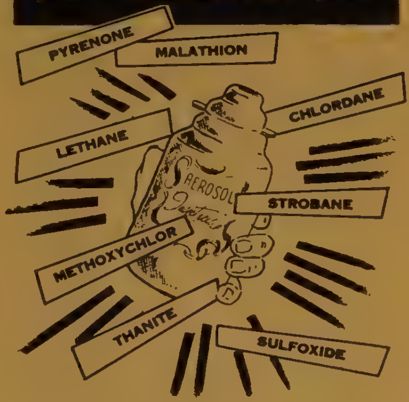
Develop Stretchable Paper

A STRETCHABLE paper product of unusual strength has been developed by the West Virginia Pulp and Paper Co., New York, under a patent held by Cluett, Peabody & Co., Inc., and is now being produced commercially.

The paper is being manufactured on a $25,000,000 paper machine capable of producing 225 tons per day at West Virginia's Charleston, S. C., mill. Licensing rights will be extended to other paper manufacturers through a new company, Clupak, Inc., organized jointly by West Virginia and Cluett, Peabody. Paper made by the new process is being marketed under the trade mark of Clupak, owned by Clupak, Inc. The first Clupak

Drop tests of multiwall sacks made of regular kraft paper (left) and Clupak kraft (right) illustrate the toughness resulting from the built-in stretch in Clupak paper.

FOR YOUR AEROSOL INSECTICIDE PERFORMANCE TESTED MASKING AGENTS!



One of the industrial perfumer's most frequently encountered requests today is the development of masking agents for the vast and rapidly expanding field of aerosol insecticides. Perfume bases designed for incorporation in these products must pass the most rigid tests concerning solubility in gas, container compatibility, and good coverage of the active insecticide ingredient. These highly technical, specialized procedures can only be satisfactorily resolved in an aerosol testing laboratory, such as the D&O Aerosol Department offers, under the direction of experienced perfumers and aerosol technicians. Whether your aerosol insecticide contains MALATHION, LETHANE, PYRENONE, CHLORDANE, SULFOXIDE, THANITE, METHOXYCHLOR, STROBANE, or any one of the other popular active ingredients . . . the D&O Industrial Odorant and Aerosol Testing Laboratories can provide *performance tested masking agents,* tailored both to your product and price range. Consult D&O.

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INSECTICIDE FOLDER

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MATHIESON PESTICIDE NEWS

Insecticide Products Department • Olin Mathieson Chemical Corporation
Baltimore 3, Maryland

TERRACLOR News Briefs

New Mixer Available

The Gustafson Manufacturing Co. has just announced a new mixer called Chem-Soil*. This equipment is designed for proper application of Terraclor.

Terraclor Goes To The Meetings

Terraclor was much in evidence and well received at the Pest-O-Rama meeting in Montgomery, Ala. on Jan. 20 and at the North Carolina Pesticide meeting on Jan. 21.

Nebraska Potatoes to Get Terraclor

Western Nebraska farmers will use Terraclor this year to control potato scab. Tests show that Terraclor provides clean, bright colored tubers with no scab, "burn-off", cankers, or black scurf.

Wheat Seed Treatment Safer Now

Terraclor is taking the hazard out of treating wheat seed which the mercurials have posed up to now. Just a few pennies worth of relatively non-toxic Terraclor seed treatment per bushel can result in smut-free yields worth up to $20 or more per acre.

New Claim For Beans

A new claim for control of white mold of snap and dry beans has been accepted. Terraclor, of course, already is accepted for root and stem rot of beans.

New Cotton Application Bulletin Available

A new cotton application bulletin giving complete details is available upon request.

TERRACLOR Literature Available

Write for these folders giving complete Terraclor information:

- Terraclor for Cotton
- Terraclor for Peanuts
- Terraclor for Vegetables
- Terraclor for Crucifers (cabbage, cauliflower, etc.)
- Terraclor for Ornamentals
- Terraclor for All Recommended Crops

NATION'S COTTON GROWERS FACING SERIOUS CERTIFIED SEED SHORTAGE

Terraclor Recommended to Insure First Planting

Cotton growers are facing a serious shortage this year of both registered and certified seed. Heavy fall rains during the past season have reduced the germination of cotton seed far below standards required for certification.

The two rows on the left are typical of certified seed gone to waste because of damping-off. The two rows on the right were treated with Terraclor.

Cotton Authorities Cite Need

The critical certified cotton seed shortage this year has found agricultural authorities in agreement over the need to protect seedlings from disease.

Dr. L. S. Byrd of Texas reported at the recent cotton production conference in Memphis that in-furrow application of fungicides is:

> "A method which, when combined with . . . 'good cultural practices' . . . will greatly increase the chances of a grower getting the desired stand with a *single planting*."

One Terraclor Application Gives Uniform Stands With One Planting

Terraclor, a pioneer in the soil fungicide field, will be a boon to cotton growers this year. One application, properly applied, will provide uniform stands with a single planting.

Growers are urged to insure a successful first planting by using Terraclor, the new soil fungicide which prevents seedling disease, thereby eliminating the need for replanting.

Dr. S. A. Williams, Clemson Extension Specialist, recently voiced the concern of authorities throughout the cotton belt when he warned: "The cotton planting seed situation for 1958 appears to be critical . . . both registered seed and first year certified seed will be scarce."

Protecting available certified seed from disease is a necessity. One properly applied treatment of Terraclor controls seedling damping-off or "soreshin" caused by Rhizoctonia and eliminates replanting. Various cotton growing states report that replanting runs as high as 10-25% of the acreage each year.

One application of 10-25 lbs. of Terraclor 20% Dust may increase yields and return to the grower more than 15 times his investment by promoting vigorous, uniform stands of better quality cotton.

Other related benefits from Terraclor protection are: 1) More efficient use of fertilizer and water through better stands. 2) More effective weed and insect control and more efficient mechanical harvesting through better stands. 3) Earlier planting with greater safety enabling growers to profit from earlier maturity.

Formulations in addition to 20% dust include 40% dust, 75% wettable powder, and 2 lb. emulsifiable concentrate.

TERRACLOR® is a trademark
*Chem-Soil is a trademark

papers being sold commercially are kraft grades.

The process used to manufacture the new paper was developed by Sanford Cluett, the man who developed the process behind the "Sanforized" trademark for shrinkage controlled cotton fabrics. Mr. Cluett is a vice president of Cluett, Peabody, which makes Arrow shirts, ties, and related products.

Gerald E. Amerman, formerly a vice president of Cluett, Peabody, has been named president of Clupak, Inc., which, in addition to licensing, will also conduct research and development and promote the Clupak trademark.

David L. Luke, president of West Virginia, described the new paper as "one of the most important developments in the paper industry during this century." He said papers made by the process might increase West Virginia's sales by as much as $5,000,000 a year.

Of interest to multiwall bag manufacturers and users is the fact that the greater toughness of Clupak paper permits the use of less total weight for sacks and bags. At the same time, the paper has a clean, smooth surface, ideal for printing.

The significance of streatchability is that it gives the paper added toughness, described by West Virginia officials as a new standard in paper performance. Previously, they said, the principal measure of paper performance was its tensile strength, that is, its resistance to tearing under stress.

Paper made by the new process is said to have a lower tensile strength than conventional kinds, but its ability to stretch or yield to pressure gives it a greater resistance to tearing.

Trial runs of the paper have been carried out for the past month on the Charleston mill machine, which is equipped with an extensible processing unit and is designed to make a sheet of 20 feet in width at speeds ranging as high as a half-mile per minute. The kraft paper manufactured under the new process is known as Kraftsman Clupak.

The paper can be made to meet specific needs of quantity users and the amount of stretch can be engineered to meet most packaging requirements.

In laboratory tests of 50-pound weights of regular kraft paper and Kraftsman Clupak paper, the new extensible paper proved to be more than five times tougher. The 50-pound regular kraft paper exhibited slightly more tensile strength, but its stretch was virtually non-existent. The 50-pound sample of Kraftsman Clupak paper, which withstood almost as much tensile stress as regular kraft paper, stretched 12 per cent before breaking. Tests of this nature were carried out in Westvaco Laboratories on all grades of paper with much the same results.

•

Tempel-Callison Plants

The Tempel-Callison Co., Sedalia, Mo., has prepared a booklet describing its custom engineered liquid fertilizer plants. Among the features of a Tempel-Callison plant are aqua conversion, product cooling, big capacity storage, and custom engineering. The company also offers skid mounted converters.

•

Lift Truck Operator's Guide

Information on lift truck construction, operation and maintenance, plus data on handling and stacking techniques, are contained in a new Lift Truck Operator's Guide produced by Towmotor Corp., Cleveland, Ohio.

The pocket-sized manual also contains valuable safety tips and shows popular lift truck accessories designed to speed the handling of "special" types of loads.

•

Electric Aerosol Sprayer

A new electrical device for the spray application of insecticides is being offered by Nisto GmbH., Vienna, Austria. The device operates on a connection of DC or AC.

A regulator makes it possible to adjust the size of the drops to create smoke, fog, or spray.

it's...

magnesia
for
greater
yields

Year after year Berkshire's EMJEO* (80-82% Magnesium Sulphate) and Calcined Brucite (fertilizer grade) 65% MgO have proved to be invaluable primary plant foods—together with nitrogen, phosphorous, and potash.

it's...

BERKSHIRE
for
highest
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magnesia

Be sure to include Berkshire's EMJEO and/or Calcined Brucite (fertilizer grade) 65% MgO in your mixtures as sources of available magnesium. You'll be glad you did.

and

it's...

BERKSHIRE'S
POTNIT*

(94/95% Nitrate of Potash) for special mixtures and soluble fertilizers.

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New from Du Pont...

UAL-S

A Uramon® Ammonia Liquor

containing ammonium sulfate for improved manufacturing and agronomic properties

Now, Du Pont offers a "Uramon" Ammonia Liquor containing ammonium sulfate. This new urea-ammonia solution, called UAL-S, combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur . . . an essential plant nutrient with recognized agronomic value.

All fertilizers benefit from nitrogen derived from UAL-S. Regular mixtures cure well, are free-flowing and resist caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well.

UAL-S is safe—handles at moderate pressure and there's no danger of flash fires. It's non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum. UAL-S has a low freezing point, too . . . can be stored year round in most areas.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, and to request the services of one of Du Pont's specialists, write the nearest office.

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AMMONIA LIQUORS

25
ANNIVERSARY
UAL
SOLUTIONS
25 YEARS OF SERVICE TO THE FERTILIZER INDUSTRY

Du Pont UAL solutions in mixed fertilizers have helped American farmers grow better crops for 25 years.

Panogen Liquid Seed Treater

The Panogen Co., Ringwood, Ill., is offering a new automatic liquid seed treater which will treat 350 bushels of seed per hour. Designated the Model LC, the new treater is of the same basic design as the larger automatic Panogen treaters.

The Model LC tumble-mixes the seed in a rotating drum in a push-button operation. No mixing or handling of chemical is required. The treater is shipped complete with ½ hp single phase motor and built-in exhaust fan for removal of chaff and seed dust.

•

Liquid Fertilizer Equipment

A 4-page Bulletin used by Jordan Corp., Cincinnati, describes OPW-Jordan valves and fittings especially developed for handling liquid fertilizers. OPW-Jordan announces its valve system eliminates hazards of solutions spilling out of fill line. Other products include quick couplers, nozzles, loading assemblies, and sight glass indicators. Units are made of aluminum, semi-steel, and stainless steel for maximum corrosion resistance.

•

Bartlett & Snow Catalog

The C. O. Bartlett & Snow Co., Cleveland, has prepared a 68-page catalog which is said to be the most comprehensive, all-inclusive catalog on dryers, coolers, calciners, and kilns that is available any place.

The catalog describes the technical and theoretical aspects of drying, construction details, experimental sizes for research and development work, detailed descriptions of each piece of equipment, and ten comprehensive equipment layouts showing arrangements of heat processing and materials handling facilities for processing a wide variety of materials.

•

D-O Hypalon Lined Pumps

Dorr-Oliver Inc., Stamford, Conn., is now offering Hypalon lined Olivite and Oliver diaphram slurry pumps. All presently available sizes of the two pumps are now lined with Hypalon synthetic rubber to provide greater resistance than heretofore to both abrasion and corrosion.

Hypalon (chlorosulphonated polyethylene) is a relatively new synthetic rubber introduced by du Pont some five years ago. To date the chemical and abrasion resistance of Hypalon has been tested on a wide variety of highly corrosive and abrasive materials. The results indicate the applicability of this new elastomer to virtually every pumping service in the chemical processing industry, according to Dorr-Oliver. In field tests conducted by Dorr-Oliver, the material is said to have excelled other natural and synthetic materials in its ability to withstand a far wider range of temperatures and chemicals, particularly oxidizing solutions.

•

Wood Tank Handbook

The National Wood Tank Institute, Chicago, has published a "Wood Tank Reference and Data Handbook" that projects the use of wood to cover the most severe conditions found in chemical processing by the use of selected polymer linings.

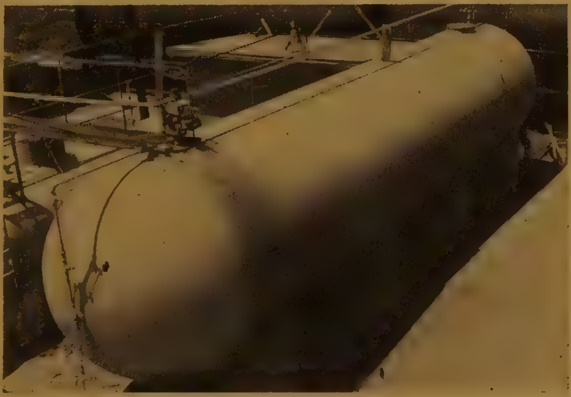
The 28-page volume, which may be obtained from the Institute, contains information on such subjects as: the uses of wood tanks, capacities, physical and chemical properties of wood, and their relation to expected service of wood tanks.

•

Diamond Nematocide Booklet

The Diamond Alkali Co., Cleveland, has prepared a booklet containing two articles that review a recently developed experimental nematocide—Diamond PRD (3, 4-dichlorotetrahydrothiophene-1, 1-dioxide). PRD is effective for the control of root-knot nematodes as well as free living forms.

The articles are reprinted from *Contributions From Boyce Thompson Institute*, Vol. 19, No. 1, and were authored by Paul H. Schuldt and Henry Bluestone and H. P. Burchfield and Dr. Schuldt. Their titles are, Nematocidal Properties of PRD and Colorimetric Method for the Determination of PRD.



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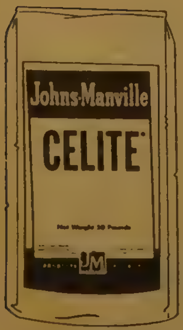

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Dow Research Booklet

"Research Chemicals from Dow," a new 40-page booklet, lists some 160 chemicals available in sample quantities from The Dow Chemical Company, Technical Service & Development, Midland, Michigan. A substantial portion of the chemicals listed are being offered for the first time.

Chemicals described are inorganics, saturated and unsaturated aliphatics, aromatics and heterocyclics. Each listing includes the chemical's name, formula, physical description, some typical properties and sample size available.

•

Bulletin Describes Hoppers

A dual-purpose hopper for the weighing or storage of fluffy, difficult-to-handle dry materials is described in Product Data Sheet 5704, offered by the Richardson Scale Co., Clifton, N.J.

This two-color bulletin discusses operating details, capacities, construction features, and methods of charging and discharging. Details of construction and installation are shown in three photographs and one schematic drawing.

•

Asgrow Duster Folder

The Asgrow Home Garden Division of Associated Seed Growers, Inc., Cambridge, N. Y., has prepared a folder listing the ingredient and use specifications of Asgrow squeeze dusters.

Asgrow is offering three types of dusters; Garden Dust, Ant Killer, and Rose Dust. The containers are designed to include likenesses of the insects and plants for which they are intended.

•

New Electric Fork Trucks

A new line of electric powered fork trucks with performance characteristics and maintenance features never before available on this type of equipment is being offered by the Industrial Truck Division of the Clark Equipment Co., Battle Creek, Mich.

The first model, of 2,00 pounds capacity, is now in production and additional models of heavier capacity are being scheduled. A major performance advantage claimed for the new machines stems from the use of a new type of carbon pile drive control which is said to provide constantly smooth acceleration from a standstill to full maximum speed and permit full control of "inching" during delicate stacking operations.

LATE NEWS BRIEFS

Monsanto Chemicals (Australia) Ltd., has entered into an agreement with Drug Houses of Australia, Melbourne, to purchase all outstanding shares of two of that company's subsidiaries; Beetle Elliott Pty., Ltd. and D.H.A. (Chemicals) Pty., Ltd. D.H.A. (Chemicals) manufacturers of various agricultural chemicals.

AC

•

Deane F. Wicks, a veteran of the paper industry has been named sales manager for the Raymond Bag Corp. Chicago.

AC

John P. Bainbridge, Jr., formerly associated with Monsanto Chemical Company, has joined Penick & Ford, Ltd., Inc., as assistant sales service manager to Dr. J. E. Killinger. His headquarters will be at Cedar Rapids, Iowa.

•

THE EASTMAN KODAK CO., Rochester, N. Y., has named Clarence J. Terhaar, a former Kansas State entomologist, to head its toxicology laboratory.

DDT TRIAL

(From Page 69)

ber of dairies in the sprayed area found their milk contaminated by DDT for some time after the spraying. Mr. Baker countered that DDT is so widely used in growing food that an average person has six parts per million of DDT in his body. Volunteers have taken up to 200 times that amount during tests with no ill effects, Mr. Baker said.

Dr. Malcolm M. Hargraves, a blood specialist from the Mayo Clinic, Rochester, Minn., was called as a surprise witness for the plaintiffs and said that DDT sprays might be encouraging cancer of the blood, Hodgkins disease and other ailments. He declared that he believed the margin of human tolerance for DDT was narrowing in the same manner as human tolerance for atomic radiation. Dr. Hargraves said he wanted to emphasize that in his testimony and other comments, he was speaking for himhelf only and not the Mayo Clinic. He said the believed that DDT and other chlorinated hydrocarbon pesticide products also were responsible for some cases of jaundice and aplastic anemia.

EDITORIAL

(From Page 27)

than half as much fertilizer as they should for best economic returns. With the fertilizer industry thoroughly capable of producing substantially more fertilizer than farmers are now using, and with the markets obviously far from saturated, a need for a scientific appraisal of the farmer's reluctance to use more fertilizer would seem to be an obvious necessity, and a logical approach to the question.

The National Plant Food Institute, which has just completed exactly such a survey (details on page 78, this issue) shows an intelligent approach to the problem, and offers in this report a tremendous service to the entire industry. It is significant to learn from the report that the average farmer's knowledge about fertilizer . . . as well as his general educational level . . . is much lower than some of us previously had suspected. This would seem to indicate that a more direct and simple approach in magazines, newspapers, radio and TV, is needed to reach farmers with more impact. NPFI is taking the first steps for better communications, and more basic education of the farmer. The Institute is also cooperating in field demonstrations and with credit agencies to help convince the farmer that fertilizer pays, — and then help him buy it.

We've known right along we had to reach the farmer more effectively. The results of this very important survey will help tell us how!

FERTILIZER MEETING

(From Page 49)

with other sources." . . . Non-users did indicate sufficient exposure to published and broadcasted information that their practices should have been influenced if this material had been understood and believed . . . . Local orientation and identification with his own situation would help. . . . Farm demonstrations and neighbors exercise a strong influence. . . . Well planned demonstrations and guided experimentation permit farmers to see results of fertilizer practices under circumstances that are easily related to their operations."

Why don't farmers use fertilizer? Non-users, says the report, most often gave "not enough money" as the reason. "Not necessary" was given almost as often and one-fourth of the non-users gave "weather" as their reason.

After discussing the financial problem, the report suggests that "Efforts to improve the availability and use of credit are likely to be more effective if a simultaneous effort is made to upgrade farmers' thinking as to optimum rates of fertilizer usage."

Examining the market potential for fertilizer in the corn belt, the report submits these figures:

Only 9 per cent of all farmers in the north central region use fertilizer on either of their two most important crops at rates approximating those recommended by their state experiment stations.

Thirty-six per cent of all farmers use no fertilizer on either of their first or second most important crop.

The other 55 per cent use fertilizer at rates much less than considered adequate.

Of all those using fertilizer on their most important crops, 61 per cent use less than 250 lbs. per acre.

About one-third of all farmers change their fertilizer practices from year to year, indicating a positive effort to improve those practices.

Summarizing their analysis, Williams and Beers said "The corn belt farmer needs to know more about the real effects from proper fertilization. He needs information on such factors as (1) his true cost of production; (2) his actual yield responses; (3) the role of commercial fertilizer in soil improvement; and (4) measures of fertilizer response throughout the growing season."

Supplementing and strongly supporting findings from the Institute survey, Dr. Joseph M. Bohlen and Dr. George M. Beal of Iowa State's rural sociology department, reported on their own studies of dealer attitudes toward fertilizer, a project supported in part by the Tennessee Valley Authority.

In surveying the role of the fertilizer dealer, it was found that the dollar range of fertilizer departments of these retailers was from $5,000 to $38,000 a year, with an average of $18,500 gross fertilizer sales. Eighty per cent of the dealers offer soil sampling services to their customers; 90 per cent help farmers plan their fertilizer programs; 88 per cent offer bulk application services; 100 per cent offer credit facilities; and 73 per cent provide small dry fertilizer spreaders.

More than 42 per cent of the dealers said they would provide more services if they could receive outside help from the wholesaler or jobber. They rated government agencies as the most important and reliable soures of information on their business, with commercial sources a relatively close second. They asked particularly for outside help on soil testing and sampling and bulk liquid application.

As to attitudes, 50 per cent of the dealers said use of commercial fertilizer is "very important;" 33 per cent thought it is "important;" and 8 per cent said fertilizer usage is "an absolute necessity." Among other matters, the Iowa report discussed best selling techniques, competition from prices, discounts, etc.

"The importance of the dealer in fertilizer distribution is self evident," Beal and Bohlen summed up their discussion.

The "Production Potentials" program originated with the old Midwest Soil Improvement Committee before its merger with N. P. F. I. Chas. E. Trunkey of U. S. Industrial Chemicals and formerly with the old committee, made the presentation.

Briefly, this is a ready-made package for dealer promotional use. Material includes wall charts with soil maps, information on soil water supplies and other data and crop management instructions. Charts are intended for use by the dealer, and a check list is provided to help each farmer reach his own set goal. With this promotional package, Mr. Trunkey said, "the dealer can sit down with his farmer prospect and show him an integrated plan of operation from fertilization and planting through harvest and storage of the crop."

Soil maps and production goals are being prepared on a state-by-state basis, with those for Illinois and Wisconsin already completed through cooperation of their respective state agricultural colleges.

Dr. John Pesek of the Iowa State College agronomy department, in explaining the role of economics in making fertilizer recommendations, admitted that it is a new concept on which little has been published and much remains to be done. In brief, it involves determination of what combinations of fertilizer elements at given costs can be used to get the best per acre profit. There's an "optimum rate" or upper limit of fertilizer application, above which the farmer cannot go without reducing his total profits from fertilizer use per acre. There's also a lower limit or "minimum recommended rate" below which the farmer cannot go without decreasing the per cent of profit from his fertilizer dollar, as well as reducing per acre profit.

"The whole field of agronomic-economic research is a new one," said Dr. Pesek, "and one which is destined to grow as time moves on."

The new wheel-track method of planting corn on freshly plowed ground without harrowing or disking was described by Dr. A. E. Peterson, Uni. of Wisconsin soils specialist, who claimed it can save farmers time, labor, fuel and machinery costs. It helps also to maintain soil moisture and reduce runoff, he said. Corn will germinate uniformly and weed control is more efficient. He also reported on experiments involving the seeding of alfalfa in corn rows, spaced 40 to 80 inches, which Wisconsin farmers find enables them to grow corn in a short rotation and still retard soil erosion.

Dr. E. R. Duncan, Iowa State extension agronomist, discussed the shift from split-boot corn fertilization attachments to single band placement equipment which places the fertilizer to one side and below the seed.

Points in favor of the single band placement method outweigh objections, Dr. Duncan maintained. Complaints registered against the new equipment, he said, appear to be due to faulty equipment or inadequate knowledge by farmers in adjusting the equipment. While effective equipment is being perfected, he advised manufacturers to check carefully with agronomists and to be sure to adequately instruct their own personnel and dealers in use of the equipment as it becomes available.

Delegates were welcomed to Chicago by Richard E. Bennett, president of Farm Fertilizers, Inc., Omaha, Nebr,, and former president of the old Midwest Soil Committee, Russell Coleman, executive vice president, National Plant Food Institute, also spoke briefly. General chairman of the conference was Dr. A. J. Ohlrogge of Purdue University, who was assisted by Prof. W. P. Martin, Uni. of Minnesota.★★

FOREST PEST CONTROL

(*From Page* 39)

the Engelmann spruce beetle in concentrating its attack on the lower portion of the trunk also led to the successful use of stirrup pumps, and the spraying of standing trees from the ground for control of this pest of spruce in Colorado. Where beetle infestations extend high up on the trunks of trees, felling prior to treatment is necessary. The usual presence of water in forested areas, and its place in emulsions, has greatly reduced the cost of this type of control. By using emulsions instead of oil solutions, it is no longer necessary to transport large quantities of oil to infested stands, many of which are in remote and more or less inaccessible areas.

Benzene hexachloride is another of the newer insecticides that is being used extensively for the control of some forest insects, especially in the South. It has greatly increased the possibilities of preventing damage to logs, lumber, and pulpwood by wood boring insects. For example, by spraying benzene hexachloride solution onto freshly cut logs, the latter are kept relatively free from attack by bark beetles and borers for a period of 3 to 4 months during the period of greatest beetle activity. This solution can also be used to spray green stacks of lumber to prevent attack by ambrosia beetles. As a matter of fact, benzene hexachloride is proving useful not only for controlling insects which attack trees after they are cut, but also for the control of certain beetles which attack standing trees. An example is its increasing use to control or prevent turpentine beetle attacks on seed trees left after cutting, and on gum producing pines in turpentine orchards. In this connection, BHC is likewise highly effective as a residual spray against the southern pine beetle. Here, the infested trees are felled, the unsalvaged portions sprayed, and the emerging beetles killed as they individually gnaw their way through the outer bark.

Some of the insecticides already mentioned, as well as a number of others, are also useful in the control of insects that damage wood products. For example, chlordane, dieldrin, benzene hexachloride, and DDT when used as soil poisons under and around dwellings, are giving good protection from termites. Also, by dipping wood for a few seconds in solutions containing lindane, toxaphene, DDT, or chlordane, protection from *Lyctus* beetles can be assured for at least five years. Finally, pressure treatment of wood with creosote, pentachlorophenol, and other materials has long been and is still being used to protect wood from both insects and decay when it is subject to severe conditions of exposure.★★

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J.C.

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AUDUBON SOCIETY

(*From Page* 34)

every year than to fire. . . . If we want perfect fruit, then the chances are we are going to use pesticide. . . . Are we going to go ahead and use these pesticides? The answer is: Yes, we are. And it is for reasons like this that we are."

Dr. George called, however, for evaluation programs to determine in advance the effects of such spray programs. "In these evaluation programs we ask—what is the cost? What is the harm that we do? What is the good? And then we decide whether or not to go ahead." He concluded by reminding his audience that such research programs cost money and require more personnel than is presently available to the Fish and Wildlife Service. He called on Congress to appropriate more funds to expand the personnel of the Fish and Wildlife Service, and to make the necessary appropriations available to universities and private research groups.★★

PESTICIDE PROBLEM

(*From Page* 33)

immune to the chemical prior to a specific acute need.

The research program recommended by Dr. George would be a combination of laboratory and field tests to organize information on toxicity, intoxication, routes of ingestion, physiological effects, biotic changes, and effects of size of area treated. Studies have shown that the type of formulation is very important in assessing the toxicity of an insecticide to wildlife. Also, in some cases, an insecticide may tend to be harmful to wildlife in the field, although it is not in the laboratory.

Dr. George called for studies to show quantitatively what the effects of duplication, drift, and accumulations of toxicant application will be. He said that perhaps the most important problem to emphasize at this time is the method and the control of application.

Copies of the report prepared by Dr. George may be obtained from the Conservation Foundation, 30 East 40th Street, New York 16, N. Y. The foundation is charging $1.50 per copy to cover the cost of printing and handling.

As to the values gained by pesticide programs, Dr. George said, there is little doubt that they are of great economic importance in agriculture. Also, they have played a very important role in bettering the health of the peoples of the world. In these areas the results of their use are impressive.

Biological control, however, was listed as an alternative to pesticides for control campaigns such as the spruce budworm and gypsy moth spray programs. In 1934 Dr. F. C. Craighead, in charge of forest insect investigations, questioned the advisability of a big control program for the gypsy moth. At that time, he pointed out that 34 million dollars already had been spent on the control of this insect without any notable achievements in preventing its spread.

Dr. George reported that in Massachusetts, where the insect originally was introduced, the gypsy moth is not a serious problem. He cited the establishment of predators and/or diseases which have brought the population under control. In the opinion of some entomologists, he noted, widescale spraying for gypsy moth control could actually aid the gypsy moth if the kill is higher in the natural parasites than in the gypsy moth. There is some entomological opinion favoring the view that insecticides should be used only on limited areas where the insect is at an extremely high population level and trees will be sufficiently defoliated for a sufficient number of years to cause their death.

On the basis of field and laboratory tests, under Dr. George's proposed evaluation program, final evaluation could be made by a team of experts working on a cooperative project and coming to objective conclusions as to the values which might be gained or lost by a specfic program and possible alternate programs.★★

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TABLE FOR FERTILIZER DEALER — STORY ON PAGE 35-38

TABLE II. State officials that control the sale of and experiment with fertilizers

State	Fertilizer Control		Agricultural Experiment Station	
	Official	Address	Official	Address
Alabama	Director, Div. Agr. Chemistry	P. O. Box 220, Montgomery	Head, Dept. Agronomy & Soils	Auburn
Arizona	State Chemist	P. O. Box 2127, Tucson	Head, Dept. Agronomy & Soils	Tucson
Arkansas	Chief Insp., State Plant Board	506½ Center St., Little Rock	Head, Dept. Agronomy & Soils	Fayetteville
California	Chief, Bureau of Chemistry	1220 N St., Scramento	Head, Div. of Agronomy	Davis
Colorado	Supervisor, Feed & Fertilizer	3130 Zuni St., Denver	Head, Dept of Agronomy	Fort Collins
Connecticut	Chief Chemist	P. O.Box 1106, New Haven	Head, Dept. of Plant Science	Storrs
Delaware	Director, State Laboratory	Dover	Prof. Agronomy & Engineering	Newark
Florida	Commissioner of Agriculture	P. O. Box 408, Tallahassee	Head, Agronomy Dept.	Gainesville
Georgia	Chief, Fertilizer Section	Capitol, Atlanta, 3	Head, Agronomy Dept.	Athens
Idaho	Commissioner of Agriculture	Boise	Head, Agronomy Dept.	Moscow
Illinois	Supt., Div. Foods, Dairies & Stan.	160 No. LaSalle St., Chicago	Head, Agronomy Dept.	Urbana
Indiana	State Chemist	Purdue Univ., Lafayette	Head, Agronomy Dept.	Lafayette
Iowa	Asst. Secy. Agriculture	E. 7th & Court Sts., Des Moines	Head, Agronomy Dept.	Ames
Kansas	Director Control Div.	Topeka	Head, Agronomy Dept.	Manhattan
Kentucky	Chief, Dept. Feed & Fertilizer	Univ. of Ky. Lexington	Head, Agronomy Dept.	Lexington 29
Louisiana	Asst. Comm. of Agriculture	P. O. Box 951, Baton Rouge	Head, Agronomy Dept.	Baton Rouge 3
Maine	Chief, Division of Inspection	State House, Augusta	Head, Agronomy Dept.	Orono
Maryland	State Chemist	College Park	Head, Agronomy Dept.	College Park
Massachusetts	Official Chemist	Amherst	Head, Agronomy Dept.	Amherst
Michigan	Chief Chemist	Lansing 13	Head, Dept. Soil Science	East Lansing
Minnesota	Chemist, Dept of Agriculture	548 State Office Bldg. St. Paul	Chief, Div. Agronomy & Genetics	St. Paul 1
Mississippi	Dir. Feed & Fertilizer Control	P. O. Box 1609, Jackson	Head, Dept. of Agronomy	State College
Missouri	Supervisor, Fertilizer Inspection	Univ. of Missouri, Columbia	Chairm, Field Corps Dept.	Columbia
Montana	Commissioner Agriculture	Helena	Head, Dept. of Agronomy & Soils	Bozeman
Nebraska	Chief, Bur. Dairies & Foods	Capitol, Linocln	Chairman, Agronomy Dept	Lincoln 1
New Hampshire	Supervisor, Seeds, Feed, Fert. & Poisons	Concord	Station Agronomist	Durham
New Jersey	State Chemist	Agr. Exp. Station, New Brunswick	Specialist in Farm Crops	New Brunswick
New Mexico	Deputy, Feed & Fertilizer Control	P. O. Box 366, State College	Agronomist	College Station
New York	Director, Bur. of Food Control	State Office Bldg., Albany 1	Head Agronomy Dept .	Ithaca
North Carolina	Asst. Commissioner of Agriculture	Raleigh	Head Agronomy Dept .	Raleigh
North Dakota	State Chemist	P. O. Box 900, Bismarck	Chief, Div. of Plant Industry	Fargo

Ohio	Chief, Div. of Plant Industry	87 No. 4th St., Columbus 15	Chairman, Agronomy Dept.	Wooster
Oklahoma	Director, Seed, Feed & Fertilizer	Div. Oklahoma City	Head, Agronomy Dept.	Stillwater
Oregon	Chief, Div. Foods & Dairies	Salem	Head, Farm Crops Dept.	Corvallis
Pennsylvania	Secy., Dept. Agr.	So. Office Bldg., Harrisburg	Head, Dept. of Agronomy	State College
Rhode Island	Chief, Bur. Markets	Veterans Bldg., Providence	Head, Dept. of Agronomy	Kingston
South Carolina	Director, Dept. Fertilizer Insp.	Clemson	Head, Station Agronomy Dept.	Clemson
South Dakota	Director of Plant Industry	Pierre	Head, Agronomy Dept.	Brookings
Tennessee	Director Div. Feeds, Seed & Fertilizer	Nashville	Head, Agronomy Dept.	Knoxville 16
Texas	State Chemist	411 State Office Bldg., College Station	Head, Agronomy Dept.	College Station
Utah	State Chemist	35 State Capitol Salt Lake City	Head, Agronomy Dept.	Logan
Vermont	Chemist in Charge Fert. Control	Burlington	Agronomist	Burlington
Virginia	Director, Div. of Chemistry	1123 State Office Bldg., Richmond	Head, Dept. of Agronomy	Blacksburg.
Washington	Asst. Director of Agr.	P. O. Box 120 Olympia	Chairman, Dept of Agronomy	Pullman
West Virginia	Chief Chemist, Dept. of Agr.	Charleston 5	Head, Agronomy & Genetics Dept.	Morgantown
Wisconsin	State Chemist	Madison 6	Chairman, Agronomy Dept.	Madison 6
Wyoming	Commissioner of Agr.	Cheyenne	Head, Dept. of Agronomy & Agr. Ec.	Laramie

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TABLE III. Composition and physological reaction of fertilizers consumed in the year ended June 30, 1956.

Kind		Average available nutrient content[2]										Calcium carbonate equivalent[3]
		N	P_2O_5	K_2O	Ca	Mg	S	B	Cu	Mn	Zn	
	1000 tons	%	%	%	%	%	%	%	%	%	%	lbs./ton
Mixtures	14,776	5.4	12.1	11.2	12.0	1.27	7.6	0.01	0.03	0.80	0.03	80A
Chemical nitrogenous:												
Ammonia, anhydrous	418	82.1	......	......	......	......	......	......	......	......	......	2,960A
" aqua (20-26%)	310	20.2	......	......	......	......	......	......	......	......	......	727A
Ammonium nitrate	941	33.5	......	......	......	......	......	......	......	......	......	1,206A
" " limestone	314	20.7	......	......	7.3	4.4	.4	......	......	......	......	N
" sulfate	414	20.8	.03	.25	......	......	23.8	......	......	......	......	2,225A
Calcium cyanamide	66	21.8	......	......	38.5	.06	.3	......	.02	.04	......	1,245B
" nitrate	56	15.4	......	......	19.4	1.5	.02	......	.002	.008	.002	320B
Nitrogen solutions (20-41%)	109	31.7	......	......	......	......	......	......	......	......	......	1,140A
Sodium nitrate	543	16.1	.02	.2	.1	.05	.07	.01	.07	......	......	580B
Urea	92	45.5	......	......	......	......	......	......	......	......	......	1,638A
Other[4]	9	19.5	......	......	......	......	......	......	......	......	......	......
Natural organics:												
Castor pomace	5	5.2	1.67	1.1	.4	.3	.04	.04	.006	.05	.06	80A
Compost	9	1.2	1.0	1.2	4.4	.4	.2	.01	.002	.01	.006	150B
Cottonseed meal	9	6.4	2.5	1.7	.24	.42	.3	.002	.002	.02	.004	200A
Dried manures	286	2.5	2.0	2.1	3.1	.72	.5	.001	.003	.03	.01	15A
Sewage sludge, activated	101	5.8	3.9	.6	1.2	.7	.55	.002	.069	.07	.10	9A
Tankage, process	16	8.1	.7	.1	.75	.01	.90	.026	.0001	.007	.007	286A
Other[5]	47	3.1	2.1	.81	3.3	.8	.4	.002	.07	.09	.10	N
Phosphatic:												
Ammonium phosphate (11-48)	47	11.3	48.5	.22	1.07	.28	2.24	.019	.016	.021	.034	1,180A
" " (13-39)	42	13.3	39.5	.20	.81	.20	6.65	.02	.02	.10	.03	1,360A
" " sulfate (16-20)	252	16.4	20.6	.18	.28	.12	15.40	.028	.025	.232	.018	1,760A
Basic slag	172	......	10.2	......	28.4	3.45	.32	.002	.002	2.31	.002	1,000B
Bone meal, steamed	11	2.2	27.4	.11	25.0	.22	.13	.0004	.0004	.001	.014	500B
Calcium metaphosphate	43	......	61.0	......	17.5	.10	.15	.006	.002	.008	.002	......
Diammonium phosphate	14	21.2	53.5	......	.05	.20	.40	......	.008	.10	.03	1,430A
Phosphoric acid (36-54% P_2O_5)	15	......	52.3	......	.04	.20	.90	......	.007	.132	.044	540A
Phosphate rock	914	.1	2.0	.3	32.7	.15	.30	.006	.002	.04	.002	200B
Superphosphate (18-22%)	607	.1	20.0	.24	20.3	.16	11.9	.001	.004	.009	.010	N
" (23-41%)	8	.1	30.5	.30	17.5	.18	8.4	.005	.007	.011	.007	N
" (42-50%)	318	.3	45.9	.35	14.2	.23	1.4	.011	.012	.015	.004	N
Other[6]	36	8.9	12.5	......	6.0	......	......	......	......	......	......	......
Potassic:												
Lime-potash	23	......	.6	6.46	30.0	3.0	3.3	......	......	......	......	B
Potassium chloride	322	......	......	58.60	.1	.20	.13	.02	......	.0001	.0001	N
" sodium nitrate	21	14.8	......	14.6	.2	.10	.1	.12	.10	......	......	520B
" sulfate	25	......	......	50.3	.5	.7	17.6	.002	.001	......	......	N
Other[7]	13	.1	.7	17.6	......	......	......	......	......	......	......	......
Secondary & trace nutrient:												
Borax	2	......	......	......	......	......	......	11.71	......	......	......	1,260B
Calcium sulfate (gypsum)	738	......	......	......	22.48	.4	16.80	......	......	......	......	N
Copper sulfate	1	......	......	......	......	......	12.90	......	24.87	......	.54	......
Magnesium sulfate[8]	3	......	......	......	1.6	14.2	19.9	......	......	......	......	N
Manganese sulfate	1	......	......	......	6.6	1.8	14.5	.29	.05	24.89	.08	......
Sulfur	25	......	......	......	......	......	95.1	......	......	......	......	5,700A
Zinc sulfate	2	......	......	......	......	.06	13.6	......	.02	.006	27.72	......
Other[9]	17	......	......	......	......	......	......	......	......	......	......	......
Total	22,193	8.71	10.13	8.44	......	......	......	......	......	......	......	......

---

[1] Scholl etal ARS 41-19 U.S.D.A. Beltsville, Md. (1957).

[2] Estimated by the author from recent determinations in State control analysis bulletins and other literature. See under "nutrients" above for names of nutrients represented here by symbols.

[3] Computed to represent materials of the composition shown. Some values that may be used to adjust these equivalents to represent materials of different composition are: N, 36; P_2O_5, 13; and S 60 lbs. of Calcium carbonate per each 1 percent.
A = the number of pounds of calcium carbonate required to neutralize the acid formed, B = basic equivalent to that much $CaCO_3$, and N = neutral physiologically.

[4] Aluminum dross, Ammonium sulfate-nitrate, Ureaform and others.

[5] Dried blood, Dried digested sewage sludge, Fish scrap, linseed meal, tankage, and others.

[6] 11-50 Ammonium phosphate, ammoniated superphosphate, basic lime phosphate raw bone meal, colloidal phosphate, Hy-grade residue, precipitated bone and others.

[7] Cottonhull ashes, manure salts, potassium carbonate, potassium nitrate, sulfate of potash-magnesia, tobacco stems, wood ashes and others.

[8] Both calcined kieserite and epsom salt, which contain around 18.0 and 10.5% Mg, and 25.7 and 14.0% S, resp.

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	S	M	T	W	T	F	S
JAN.				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	
FEB.							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	
MAR.							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					
APR.			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30			
MAY					1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
JUNE	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30					

	S	M	T	W	T	F	S
JULY			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		
AUG.						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						
SEP.		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30				
OCT.				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	
NOV.							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30						
DEC.		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			

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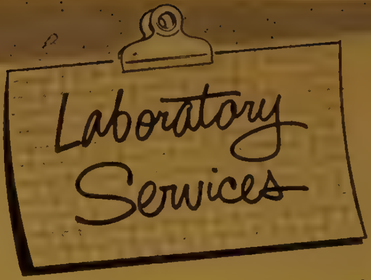

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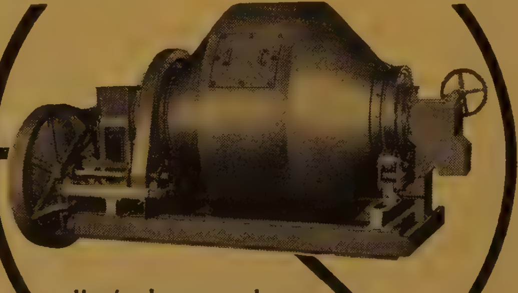

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EVEREADY LINE

(From Page 29)

All shipping cartons are lithographed in full color to aid point of sale display. Shipping cartons for the squeeze dusters carry an exclusive tear strip, similar to that on cigarette packages, to facilitate opening.

Packages for the "Eveready" brand line were designed by Robert Neubauer of Neubauer Associates, Bridgeport, Connecticut, well-known award-winning package designer, who previously designed the new "Prestone" anti-freeze package for Union Carbide.

Suppliers of containers, shippnig cartons, displays, etc., include Continental Can Co., Owens-Illinois Glass Co., Bradley Container Co., Arkell & Smiths and Hinde & Dauch.

Advertising plans for the "Eveready" garden products line include full page color advertisements in *Better Homes & Gardens, Flower Grower* and *Popular Gardening*, as well as network spots on Union Carbide's Omnibus TV program. This national advertising program will be backed up in certain test areas by radio announcements and local newspaper space.

In another move to attract attention to the new pesticide line, a series of awards will be offered for the "Gardener of the Year." Garden clubs are being asked to nominate entries to compete in the contest which will involve answering 100 questions about pesticides and gardening, plus an essay on the same general theme. There will be one major award winner, plus 48 state winners. Awards will include an all-expense trip to New York, a home greenhouse, power lawn mowers, portable radios, seeds and garden supplies.★★

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TALE ENDS

Live steers, hogs, chickens, etc. were quartered in a ball room at New York's plush Waldorf Astoria on February 20th, with hundreds of luncheon and cocktail guests given an opportunity for a first-hand view of what goes on at Chas. Pfizer and Company's research and development center, normally located at Terre Haute, Ind. Transplanting the Pfizer Farm to the Waldorf was designed to call attention to the veritable revolution in productivity which has taken place on the American farm in recent years and to bring home directly to the typical consumer what this revolution has meant to the family purse in terms of lower production costs and more and better food.

AC

A new use has been found for weed killer in England. Would-be junior spacemen are reported to be mixing a popular herbicide with sugar to produce a propellant for a home-made guided missile. After four casualties resulting from permature blasts, police asked store proprietors to refuse to sell weed killer to teen-agers.

Strike Two!

WHEN they've got you two strikes down, it's sort of hard to take your best cut. And when you're a salesman out calling on the trade, and they don't remember your company, and never heard of its product, they really have two strikes on you.

The moral of this story is that when you send your salesmen out to call on what should be live prospects, if you want them to take that big full swing and maybe knock out a sales home-run or two, see that they don't already have two strikes on them when they step up to the plate.

Pave their way in advance, with an advertising program that will make your company name and your products familiar to the prospective buyer. In the field of agricultural insecticides, fertilizers, herbicides, etc., the magazine that can do the best job of presenting your sales story to the important people in the commercial end of the business who make most of the important purchasing decisions, is

AGRICULTURAL CHEMICALS

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Models are standard equipment in the "advertising game", calling attention to the glamorous, as well as somewhat ordinary products. The excuse for the above picture is a new product for the home gardener, "Dyna-Green", made by Leed Chemical Products Co., Chicago. The product appears to be a coloring material, "safe, non-toxic, and color fast", which the accompanying press release says will turn grass "a lovely, natural green upon contact." Fortunately, the material is formulated with a fertilizer to actually build health into the lawn.

AC

A tree fertilization test program, which is scheduled to extend over a twenty-year period, is getting under way on a 100-acre tract near Milton, Fla. Collaborating in the program are the Marianna Forest Research Center of the U.S.D.A. and Escambia Chemical Corp., Pensacola, Fla. The Florida experiment on pine fertilization is designed to establish whether or not it is practical economically to stimulate tree growth and fertilizer applications. Different amounts and strengths of various types of fertilizers will be applied.

AC

First in line to get USDA approval on use of a chlordane emulsion for pre-emergence control of crab grass is the National Carbon Co., New York, who are offering a new line of home garden products (see story, page 27.) "Eveready" 72% chlordane crab-grass preventive has USDA approval for sale for pre-emergence control of crab grass. The material also provides effective grub and insect control.

AC

Philadelphia and New Jersey officials are reported to be considering use of Philadelphia sewage wastes as fertilizer in the southern New Jersey pine barrens. Commissioner J. E. McLean of the N. J. State Department of Conservation and Economic Development suggested that "With New Jersey industrial and residential expansion continuing at their present rate, our state may run out of agricultural areas within the foreseeable future. If we begin a long-range soil-conditioning program now, we will be developing today's wasteland as farm land reserves for the future."

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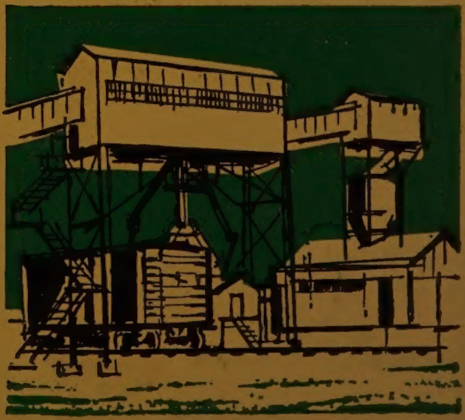

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